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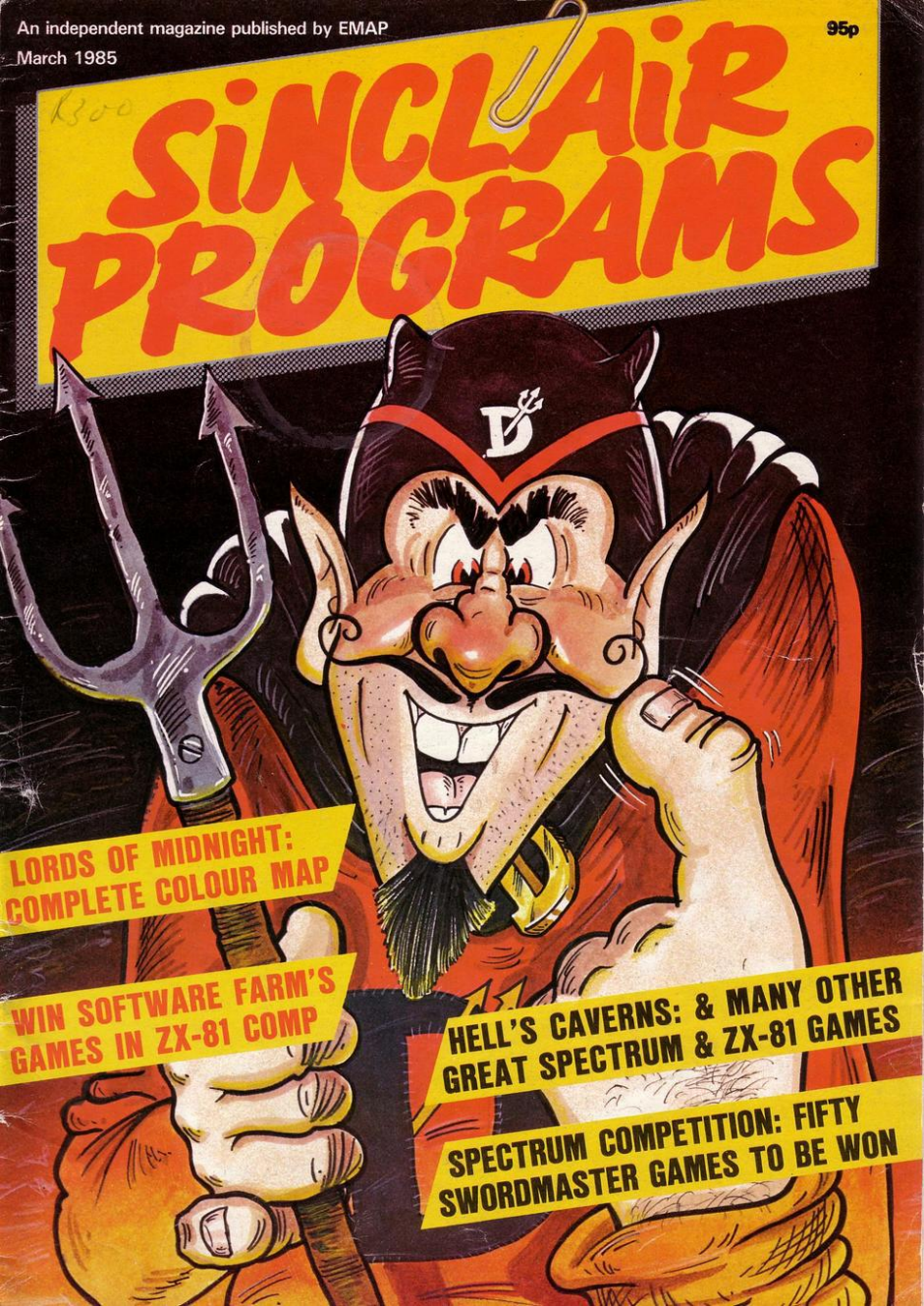
SINCLAIR PROGRAMS



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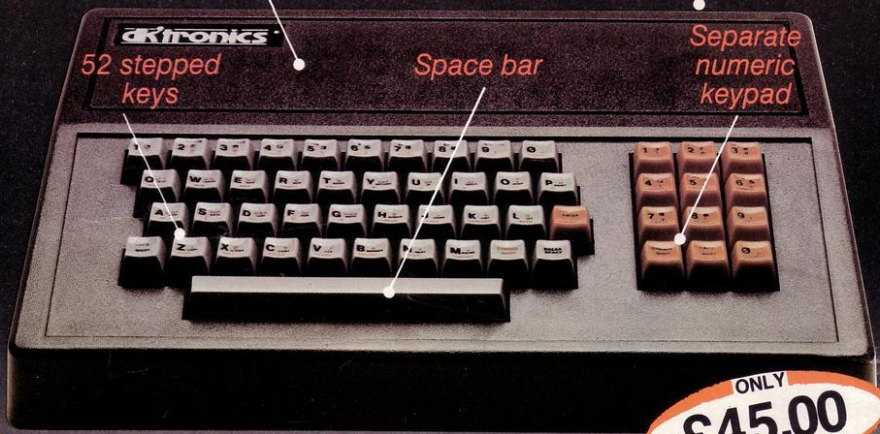

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CONTENTS

Graphics instructions 5

Soft Focus

Listings 22

Program Tutor 23
Listings 26
Got it licked 30
Pen friends 31
Sprogs 33

Beginners' 45
Spectrum competition 49

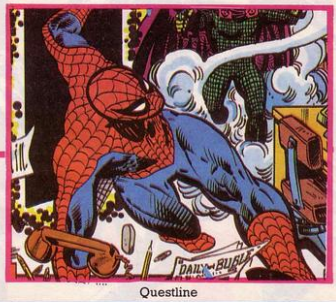
Soft spot 50
Listings 53

Editorial 5
Letters 7
News 10
Chart 15

Soft focus 16
ZX-81 competition 21

Program Tutor

Listings 34
Questline 43



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ALL THE listings which we publish in *Sinclair Programs* are written by readers. Everything from the simplest Basic listing to the most complicated machine code routine has been written, not by a professional, but by one of our readers.

If you have written a program which you would like us to consider for publication, there are several simple guidelines which you should follow. First, debug the program. Then run the program and do all the stupidest things which you can imagine. Try to run off the edge of the screen. Deliberately jump to your death in the most unlikely places. Type in responses which are totally ridiculous. If you find any problems, debug the game again.

Next, look at the length of the program. Constraints of space mean that we cannot publish all the long programs which are submitted to us. If your listing fills fewer than ten screens of text, then it is around the right length. If it is too long, check it again. Have you wasted space with repetition of subroutines, or needless use of BIN statements? Make your listing as short as possible, so that other people will find it quick to type in to their computer.

Finally, record your program on a cassette, label it clearly with your name and address, write a covering letter explaining what the program does, and post it to us, together with a stamped, addressed envelope.

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Telephone 01-251 6222

If you would like your original programs to be published in Sinclair Programs, please send your contributions, which must not have appeared elsewhere, to:
Sinclair Programs,
EMAP,
Priory Court,
30–32 Farringdon Lane,
London EC1R 3AU

Programs should be on cassette. We cannot undertake to return them unless a stamped, addressed envelope is included. We pay £25 for the copyright of listings published and £10 for the copyright of listings published in the Beginners' section.

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Cover Illustration—Paul Carney

Instructions for graphics characters are printed in lower-case letters in our listings. They are enclosed by brackets and separated by colons to distinguish them and the brackets and colons should not be entered. Do not attempt to underline the characters, the underlining is used specifically to point out a graphic character.

Inverse characters are represented by the letter "i" and graphics characters by "g" on the ZX-81. Thus an inverse W would be represented by "iW", a graphics W by "gW", and an inverse graphics W by "igW".

Spaces are represented by "sp" and inverse spaces by "isp". Whenever any character is to be used more than once, the number of times it is to be used is shown before it, together with a multiplication sign. Thus "6★isp" means six inverse spaces and "(g4:4★i4:g3)" would be entered as a graphic four, followed by an inverse four repeated four times, followed by a graphics three.

Where whole words are to be written in inverse letters they appear in the listings as lower-case letters. Letters to be entered in graphics mode on the Spectrum and Spectrum+ are underlined.

Inverse characters may be entered on the ZX-81 by changing to graphics mode and then typing the appropriate characters and on the Spectrum and Spectrum+ by changing to inverse video and typing the appropriate letters. Graphics characters may be entered on the ZX-81 by changing to graphics mode and then pressing symbol shift while the appropriate characters are entered. On the Spectrum and Spectrum+ graphics characters may be obtained by changing to graphics mode and then pressing the appropriate character. User-defined graphics will appear as normal letters until the program has been RUN.

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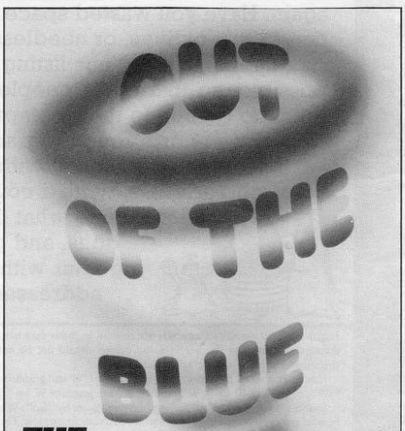

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LETTERS

Send your thoughts to us at Letters, Sinclair Programs, Priory Court, 30–32 Farringdon Lane, London EC1. We pay £2 for every letter published.

Loading problems

I AM writing to say that I have been buying **Sinclair Programs** for two years now, and I think that it is excellent.

I would like to know whether anyone has any loading and saving information for the ZX-81, because I have been having problems trying to save the programs which I have copied from *Sinclair Programs*. I have tried: moving the leads and changing them, changing the volume, changing the tapes, moving the tape recorder around, and moving the plugs to different power points. If you have any suggestions, please contact *Sinclair Programs*.

Timothy Moore, Dawlish, Devon

• *Try cleaning the heads on your cassette recorder, Timothy. Dirt may be interfering with the recording process.*

Light pen advice

I AM writing to you about my experiences with the **Trojan light pen.** At the time I bought mine I owned a black and white television. I have now invested in a colour television and the pen will not work. When successfully loaded, the program crashes the Spectrum's memory, causing a reset. My advice to other Spectrum owners is to check the pen on a television similar to their own before purchasing it.

Gary Hale, Wallsend, Tyne & Wear

Decathlon impossible

After buying **Daley Thompson's Decathlon** I thought that it was great until I reached the high jump. I am sure that it is impossible. I cannot jump it even on level one.

If anybody has done it, please let me know how they did it.

Chris Buxton, 8 Byrl Street, Keighley, Yorks.

Helpful Menzies

FOR months and months I have been pleading with my Mum to let me buy the all-new games development program, *White Lightning*. Finally she gave in and I jogged into my local *John Menzies* and bought White Lightning. When I got home I quickly loaded it and, to my surprise, the demonstration tape would not load. So, two weeks later, I returned it. At the desk, they were just about to put another copy of White Lightning on the shelves. I told them of my problem and they gave me a brand new replacement package. I was very pleased. I find the language extremely hard to understand so, if anyone has any tips, please let me know via *Sinclair Programs*.

Daniel Meldrun, Letchwort, Hertfordshire.

High-res on the 81

ON THE SUBJECT of hi-res display on the ZX-81. I should like to share the following information with readers. The following routine sets the ZX-81's I register to 0. As the start of the Z80's dot pattern table is determined by the I register, any CHR$ PRINTed, followed by RAND USR 16514 will be turned into a meaningless pattern. POKEing 16515,30 will return the characters to normal.

```
  HEX
3E  00      LDA 0
ED  47      LD I A
C9          RET
  MAIN PROGRAM
PRINT CHR$ 255
RAND USR 16514
PAUSE 4E4
POKE 16515,30
RAND USR 16514
```

Philip Parker, Whitnash, Leamington Spa.

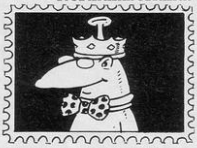
Alchemist wanted

ON reading your September issue I saw James Sheahan's letter saying that he had completed **Sabre Wulf** from Ultimate. Well, I completed the game on the 4th of May this year and therefore two months before him. Sorry James, not quick enough.

I have since completed it eight times. My highest score is 154, 940 with a percentage of 94. I had nine lives at two points in the game.

If anyone out there in computerland can complete the **Alchemist** I would like to know what the four objects are that you have to collect, because the game is driving me MAD.

Stephen Barrett, Cramlington, Northumberland.



I AM writing to tell you that Richard Bairstow, aged 12, was neither the youngest player nor the first player to solve **Lords of Midnight.** My brother, aged nine, solved **The Hobbit** when aged seven, and solved Lords of Midnight in September. I, on the other hand, am baffled by it, so thanks for the tips, Richard.

Kathryn Taylor, aged 12 Widnes, Cheshire.

Please complete this form and enclose it with any program which you send to us for possible publication.

To: Sinclair Programs, Priory Court, 30–32 Farringdon Lane, London EC1.

I enclose .....Program(s) for the ..... computer.

I guarantee that each program submitted is my original work.

Signed .....

Name .....

Address .....

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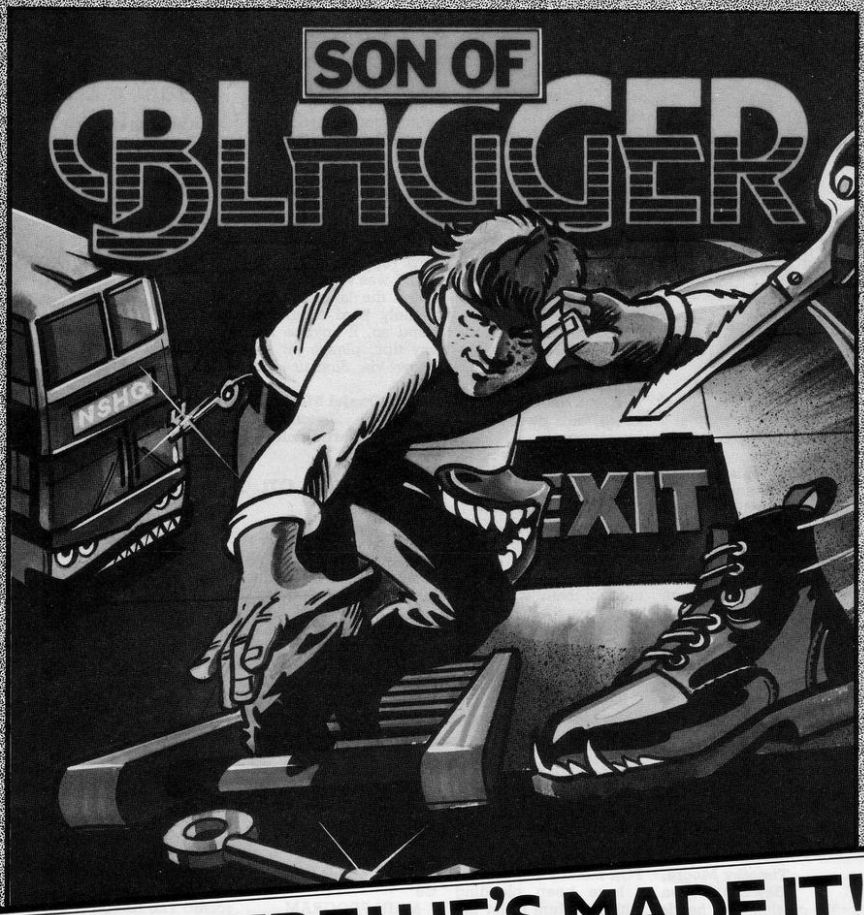

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6. Snake
7. Snake Nest
8. Gremlin
9. Mound
10. Pile of Earth
11. Cave

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You must excavate this precious metal – but can you survive the giant rats and that vicious Gremlin which will come to infest your mine? Can you trick the snakes into leaving their comfortable nests and destroy the rats for you? Can you keep the Gremlin at bay?

Riches await you – but so do the hazards!

ROCKET MAN

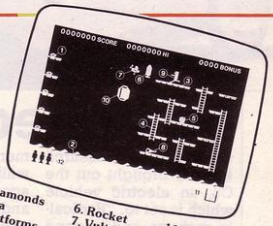
Get rich quick by collecting Diamonds that are simply lying there waiting for you!

Oh . . . I forgot to mention that there are one or two problems!

There is an expanse of shark infested water between you and the Diamonds and a strange breed of Bubble that seems hell bent on getting you in it! Somehow you must cross it . . . .

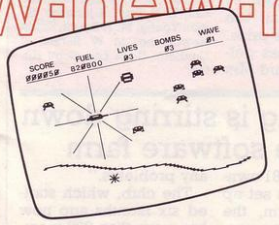
You have a Rocket Pack to help you (a Vulture on higher levels) but you must rush around the platforms and ladders collecting cans of fuel (legs of lamb with the Vulture) and cursing that weird Bubble. Once you have enough fuel then it's Chocks Away!

Oh . . . but don't run out of fuel on the way – otherwise it's . . . SPLASH!



1. Diamonds
2. Sea
3. Platforms
4. Ladders
5. Fuel Cans
6. Rocket
7. Vulture
8. Leg of Lamb
9. Player
10. Bubloid
11. Fuel Gauge
12. Men remaining

new·new·new·new·new·ne



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NEWS

Switched on

SINCLAIR Research have brought out the C5, an electric vehicle which is set to, "Radically reshape and expand the market for practical and personal transport." as Sir Clive Sinclair said at its launch.

Anybody over the age of 14 is legally entitled to drive the C5. Tax, insurance and even a licence are not required.

Driven by a rechargeable battery, the C5 is open-topped and therefore exposed to the elements, unless you are willing to pay extra for accessories. It costs £399 and its top speed is 15 m.p.h.

C5s come in one uniform colour and, since they have no distinguishing features such as registration numbers, serious misunderstandings between owners seem possible.

Advantages of the C5, apart from the low price and running expenses are that they are pollution free and quiet.

Currah shut up

CURRAH, the producers of the microspeech unit, have gone into liquidation. Dk' Tronics are taking over the trading name to become sole manufacturer of all their products; Microspeech, Microslot and Microsource.

At present Welwyn Electronics have the right to manufacture the units, but this is expected to change as soon as their stocks are exhausted.

Both firms, for the present, are responsible for handling enquiries and may be contacted on the following numbers: Dk 'Tronics: Saffron (0799) 26350 and Welwyn Electronics: (0670) 822181.

Cub competition: all the winners

WINNER of our December competition to win a Microvitec CUB Monitor, was 14 year old Robert Bibby from Radcliffe, Lancashire. He has only owned his Spectrum for six months but is already busy writing a program to help his mother with an evening course she is studying. When told of his prize Robert said "I'm really glad I won the prize because I have become a real computer freak." Robert's mother and younger brother are quickly becoming addicted to the computer themselves and all are delighted with his prize. "The television has gotten a little old," said Mrs Bibby.

The runners-up who will receive either Fighter Pilot, Pyjamarama or Witch's Cauldron are:

Mr R. Evans, Alan Taylor, John Stevenson, Andrew Brame, John Lucas, W J de Jong, Simon Jinks, Mark Parker, Brian Walbey, David James, Simon Fowkes, Keith Thompson, Mr T Clarke, Denise Jennians, Philip Cooper, Paul Carpenter, R J Day, N F Dudley, Andrew McCrae, Mr S I Hedges, Richard Balke, Colin Gilmore, Henrik Nielsen, John Watt, John Ramsden, Neil Johnson, C and A Smith, Nigel Rogers, J Crane, M Davies, Zoe Stewart, B W Roper, Brian Traymor, S Brodie, Jamie Martin, Mr Brooke, C Arnold, Jane Lusk, Allan Schmalz, Mark Bittorf, Michael Ball, W H Tratt, R Johnson, Simon Young, Mr N Bright, Susan Newcombe, M W Barlett, P Lambeth, Colin Lee, Scott Hilton.

Something is stirring down on the software farm

A CLUB for ZX-81 owners has been set up by Software Farm, the firm dedicated to producing good games for the ZX-81.

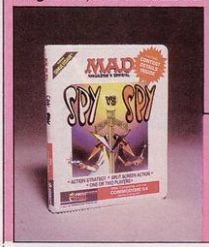
Julian Chappel, owner of Software Farm explains. "We started the club to give support to all the owners of ZX-81 machines. We wish to keep all these people up-to-date with information, new programs and generally help with any problems."

The club, which started six months ago now has more than 200 members. There is a membership fee of £4 per year for which members receive: a quarterly newsletter, membership card, club badge and discounts of 10 per cent on any Software Farm programs. The club can be contacted through Software Farm, 155 Whiteladies Road, Clifton, Bristol.

Through the square window

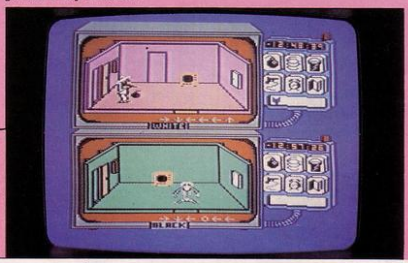
EASTER will see the launch of three new games from Beyond Software, which are intended to take your Spectrum into a new dimension.

Spy v Spy is being converted from the successful Commodore version. Based on the characters from **MAD** magazine, it is described as a "Simulvision game." Using arcade action, the game takes place with window effects, that is, you see two different locations on screen at the same time.



Shadow Fire, described as a "Text adventure without text," will be, as far as we know, the first game to incorporate the option to use a light pen. The game involves control of six individual characters set in arcade scroll scenery. "Adventure games usually involve a plot where, to reach your final target, you must fight your way through obstacles designed to hinder your progress. We have taken this theme and used it for Shadow Fire." explained Marc Peirson.

Romper Room, is their new education program. Using different themes it takes you through the alphabet with the aid of a 'Little man who draws the letters and demonstrates their meaning.' It is aimed at 2–7 year old children and is accompanied by music.



Hot and cold-on and off

RICHARD Shepherd Software, publishers of **Inferno,** have been tempted back to producing games for the Spectrum, and will soon launch a new game.

Shepherd explained: "Although we had changed to the Commodore market, we now know that the Spectrum is the biggest selling microcomputer in this country. Our decision has been further influenced by our new game."

Called **Ski Star 2000,** it is described as "A real 3D simulation game with highly developed qualities. The scene shows you looking through a pair of goggles onto a slalom, down which you ski."

It's the reflex

FANTASY Software are planning to launch two new games for Easter, one of which involves some hush, hush talks with a well known company.

A name has yet to be decided, but it is being referred to as **Reflex** at this stage. Without giving too much away, Paul having discussions with one of the leading electrical-type firms in this country." The only information he was able to give was that "It will be a definite arcade game, involving a piece of equipment which will cause people to react with surprise!"

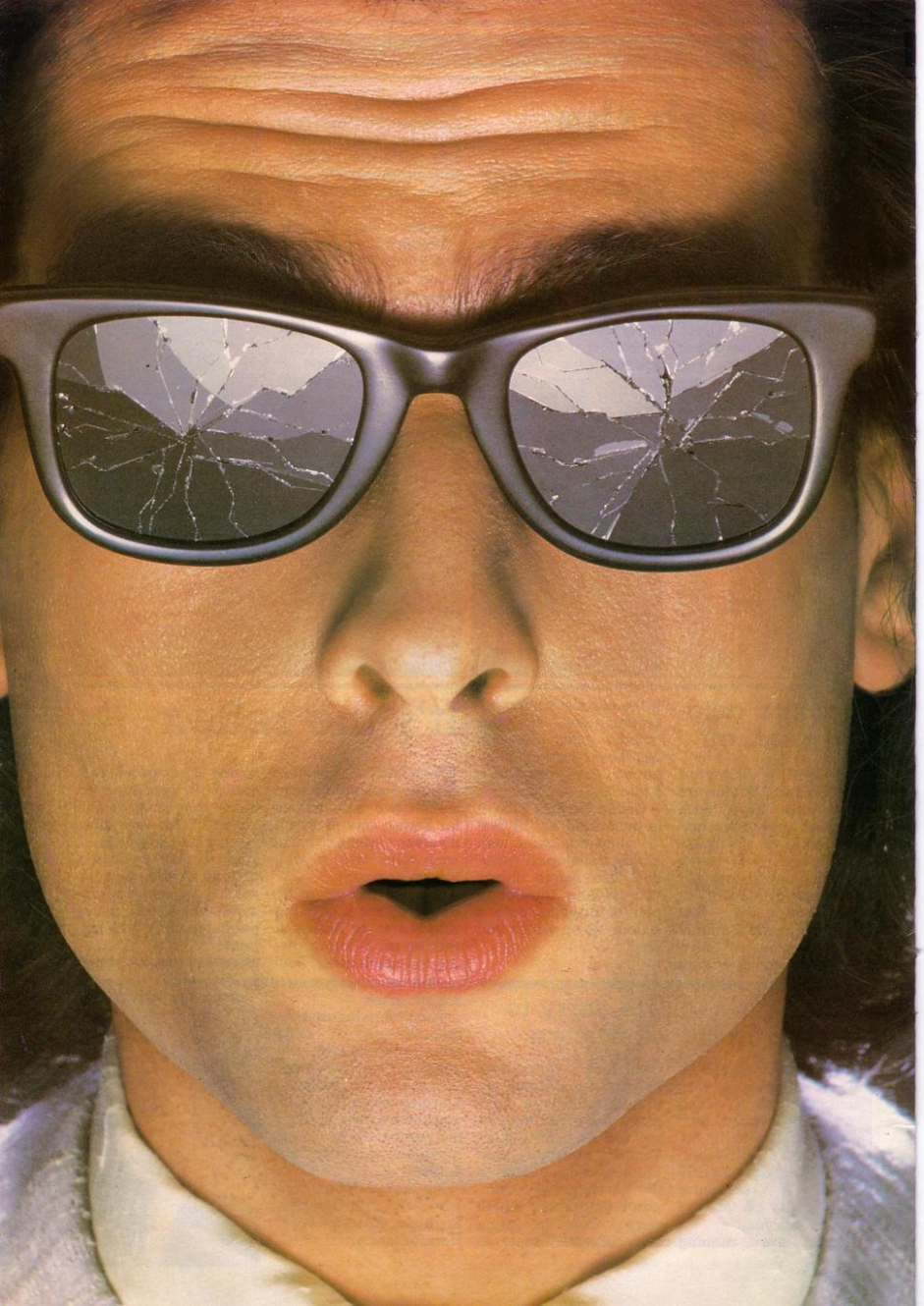
Harassed hackers hurry to holiday in Herefordshire

IF YOU cannot bear the idea of leaving your computer even while you go on holiday, or if you would like to devote your spare time to learning a useful accomplishment, a computer holiday may be the one for you this year.

Tops are running week-long computer holidays from March until August this year. Each student is given individual use of a BBC B or Tatung Einstein computer, and has access to the centre's other computer equipment which ranges from an extensive software library to robotic arms.

The computer courses include study of music and graphics on the computer, as well as the opportunity to program buggies and to work on your own projects. Also included in the week are a number of outdoor activities.

For further details contact TOPS, Old Gloucester Road, Ross on Wye, Herefordshire.



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Check with daily updates on the very latest computer news.

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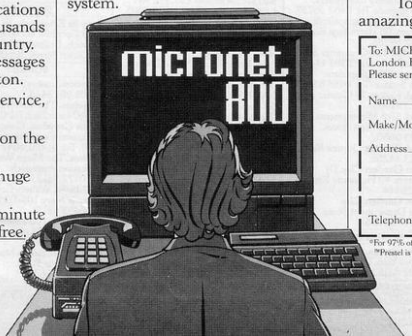

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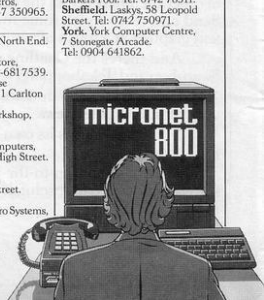


THE CHART

1	Daley's Decathlon	Ocean
2	Sabre Wulf	Ultimate
3	Lords of Midnight	Beyond
4	Jet Set Willy	Software Projects
5	Knight Lore	Ultimate
6	The Hobbit	Melbourne House
7	Manic Miner	Software Projects
8	Ghostbusters	Activision
9	Matchday	Ocean
10	Pyjamarama	Mikrogen

HEIGHTS ⬆ DEPTHS ⬇

1	Transylvanian Tower	Richard Shepherd
2	Make a chip	Sinclair
3	Chequered Flag	Psion
4	3D Tunnel	New Generation
5	Vu 3D	Psion

To register your votes, let us know the program you like most, and the program you hate most. Add your name and address, which will make you eligible for the £10 chart prize. Send your votes to CHARTLINE, Sinclair Programs, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU.

Winner of this month's chart prize is Jennifer Millar of Bangor, County Down.

GOD GIVEN

GIFT OF THE GODS

THE trend in 1984 was towards George Orwell and modern literature. Computer games in 1985 seem to be reacting against this, with a strong movement towards Greek mythology. **Gift from the Gods** takes up the classical story of Orestes. You star as Orestes, and your aim is to avenge the murder of your father, Agamemnon, by your mother Clytaemnestra. In doing so you have the help of your sister, Electra and the gods Zeus and Apollo.

All good stuff and, for once, a powerful storyline is backed by an excellent game. Gift from the Gods takes the form of an animated adventure in which Orestes moves through the labyrinth, flies through the air, fights the monsters and attempts to find and follow his sister.

Orestes' aim is to find the six Euclidian shapes which will reveal the exit to the labyrinth when positioned correctly in the Guardian's chamber. Orestes is opposed by the demi-gods who live in the Guardian's chamber. They use their powers of illusion in order to prevent discovery of the shapes.

Electra knows where to find the correct six shapes, but Clytaemnestra knows of her purpose and is trying to kill her, and to steal the shapes. Another problem is the terrifying illusory creatures created by the demi-gods to sap Orestes' strength. Enormous spiders, skulls with worms twisting through their eye sockets, any amount of weird creatures which you would fear to meet in broad daylight not alone in a hostile maze.

Great fun and very complex, Gift from the Gods is produced by Ocean Software, Ocean House, 6 Central Street, Manchester M2 5NS.

Price: £9.95
Game type: Animated adventure
Rating: 79%

AIRWOLF

JUDGING difficulty levels in a game is never easy for a reviewer. If a game appears easy is that because the reviewer has played ten other games like it in the past week? If it appears difficult, is that because the reviewer has not devoted enough time to it?

However, without qualification, **Airwolf** can be defined as difficult to the point of absurdity. The first screen is easy enough, for there are no obstacles to overcome, but on the second screen your way is blocked by a massive wall. Touching the wall or the ground below it means certain death, but in order to shoot a passage through it, you must steer your helicopter up and down it many times.

A further problem is that the wall rebuilds itself very quickly, so you only have a short period in which to shoot your way through.

It is not impossible to get through this wall, although it is probably next to impossible if you do not possess a joystick. After half an hour's work from six reviewers, one finally made it through the wall only to meet . . . another wall.

Those people who are attracted to Airwolf with the aim of 'beating the reviewers' may be interested to know that the game sets you up as Stringfellow Hawke, the only man who can fly the billion dollar helicopter Airwolf and, therefore, the man who can save five US scientists.

Airwolf is produced by Elite Systems Ltd, 55 Bradford Street, Walsall.

Price: £6.95
Game type: Arcade
Rating: 10%

SKOOLDAZE

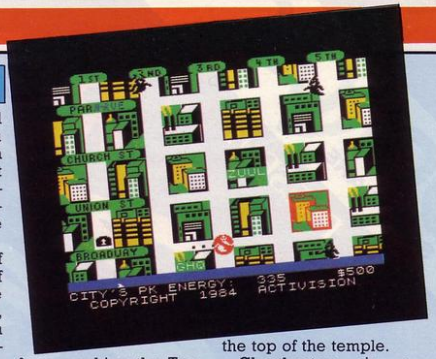
TAKE 600 lines boy, you are not a kangaroo, barks the harsh history master. Not an auspicious start to **Skooldaze,** and there is worse to follow. You arrive in your geography class to find that overcrowding in schools is worse than you thought. There are six boys, and only four seats. Two people are going to have to stand. Well aware that if you stand you will be given lines, you push the swot, Einstein, out of his seat. The creep pushes you out again. You push the smallest boy in the school to the floor and sit down smugly. The master enters and begins the lesson as the smallest boy pushes the next boy to the floor, he then pushes the tearaway down, the tearaway hits the bully, the bully and the swot fight for a seat, and then the inevitable happens, the bully pushes you to the floor. The master looks up from the list of questions he is reeling off, "600 lines, Eric, get off the floor immediately", "Oh, but sir . . ."

Your main worry, though, is not the injustice of school life, but the fact that, locked in the school safe, is your school report. This is bound to be bad news if anyone sees it, so you find and destroy it. How? Now, that is a good question. Each of the masters knows one element of the safe combination. Of course, though, they do not want to tell it to you. Your only chance is to set all the shields in the school flashing in order to disorientate the masters, and then knock the masters down so that they involuntarily shout out part of the code. A very complex plan.

Produced by Microsphere, 72 Roseby Road, London N10.

Price: £5.95
Game type: Arcade
Rating: 75%

GHOSTBUSTERS



SURELY no program can have achieved as much popularity before its launch as has **Ghostbusters.** Three weeks before its launch it was already in the top ten of one computer magazine. Even *Sinclair Programs* readers were naming it as their favourite game before it went on sale.

Sadly, this enthusiasm is misplaced. Much of the appeal of the film on which the game was based lay in its humour and its use of sound. The game follows the plot of the film faithfully without ever catching its mood.

The first stage of the game involves collecting your ghost busting equipment. This could be done quickly and simply, but instead you have to manoeuvre a fork lift truck to collect items. A slow way of covering one of the less interesting parts of the game.

Despite a rousing, if rather tinny, version of the Ghostbusters theme before the game begins, the game continues in stony silence. An exception to this is the occasional use of speech, created without any hardware add-ons. A clever effect, but a more lively use of sound throughout the game would have been better.

The game involves catching some ghosts, and preventing others from reaching the Temple of Zuul. Success will lead to fat profits for your ghost busting business which are essential to your success in the game. Eventually you must make your way to the Temple of Zuul, sneak in, and make your way to the entrance at the top of the temple.

Ghostbusters is a straightforward game with little to recommend it. It is produced by Activision, 15 Harley House, Marylebone Road, Regents Park, London NW1.

Price: £9.99
Game type: Arcade
Rating: 40%

AIR TRAFFIC CONTROL

SOME simulations are games, intended purely for enjoyment. Others make claims to be completely accurate simulations, and they have considerable educational value as well as being fun. **Heathrow International Air Traffic Control** falls into the latter category.

The program comes in two parts. One side allows you to simulate controlling air traffic at Heathrow airport, the other side allows you to try out the same job at Schiphol airport.

The programs are divided into eight levels. Level one allows you to practice landing light aircraft at your airport. By level eight you have to cope with incoming and outgoing aircraft of all types, the likelihood that one aeroplane will declare an emergency and have to land as soon as possible and the possibility that some of your equipment will break down, you will lose radio contact with one plane.

The programs are startling in their complexity, but their accuracy does, in some ways, lower their appeal. After all, while it is interesting to understand the problems of an air traffic controller, it is not necessarily fun to have to deal with them all, or to have train yourself to the skill level necessary to complete even the simplest operation.

Detailed, but perhaps rather more worthy than fun Air Traffic Control is produced for the 48K Spectrum by Hewson Consultants, 60a St Mary's Street, Wallingford, Oxfordshire.

Price: £7.95
Game type: Simulation
Rating: 65%

SON OF BLAGGER

IT IS safe to say that I liked **Jet Set Willy,** you liked Jet Set Willy, we all liked Jet Set Willy. It is safe to say that because sales figures, charts, readers' letters, readers' votes and reviews all agree on these points. What it is not safe to say, bearing these things in mind, is that we will all like every game which is based on the Jet Set Willy theme.

There are major differences between **Son of Blagger** and Jet Set Willy, but it is the latter which wins in every case. As Slippery Sid, the son of Blagger, you must make your way through the Spectrum Security Headquarters, collect the golden keys from the maze of passages in the complex.

Sid is larger than Willy, the screen scrolls smoothly from one part of the maze to another rather than changing only when you leave a room, the monsters and layouts are different in both games. Despite these differences it is obvious from the moment the first room appears on screen where the idea for Son of Blagger came from.

Unfortunately, the idea is a failure. The game shows the fragility of the success of Jet Set Willy, how easily it could have slipped from the excellent to the mundane if it had shed its quirky humour and all the small touches which made it a pleasure to move from one room to the next.

Son of Blagger is produced for the 48K Spectrum by Alligata Software, 1 Orange Street, Sheffield.

Price: £5.95
Game type: Arcade
Rating: 40%

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Each glass has a RUNIC inscription around its base which you must read and understand. Only saying these words will lift that part of the spell. To protect the hour glasses Zendos has placed them in 12 separate rooms in his castle, each room linked to a different exterior gateway by a devious route.

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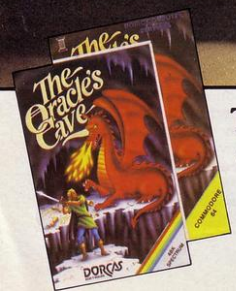

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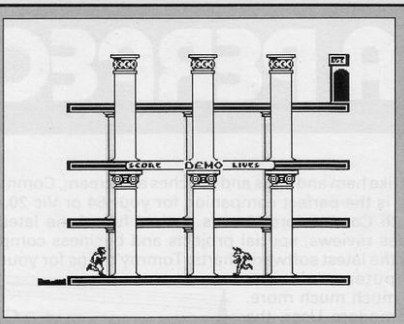
HELLFIRE

THE incongruity of the combination of literary epic and computer game appears to appeal to software houses. Melbourne House have taken up this genre once again with the release of **Hellfire,** a computerised version of the trials of Ulysses.

The first screen sees you, as Ulysses, jumping from slope to slope up to the top of Mount Olympus, avoiding the bouncing boulders which fall from time to time. If you delay your ascent for too long, the Gorgon will appear at the top of the screen and start giving you dirty looks, so it is best to move quickly. Classical **Donkey Kong,** whatever next?

Next is an extremely original screen, you move into a maze-like sacred temple. It looks simple to negotiate, but running behind the first pillar brings you out on the fourth floor, and trying to run back again transports you to the third floor. To make matters worse, a minotaur, apparently oblivious to the maze-like qualities of the place, is charging around the first floor, and another one is likely to appear if you hang around for too long. Your route is likely to tend toward the circular unless you bear in mind that the temple door mat can be used as a springboard.

Having passed through the Temple of Knossos you then pass onto another maze which, this time, is inhibited by the reptilian Assasin and the Fireball Thrower. Solve this maze and you can join your friends in the Elysium Fields and make it into the ranks of the superhero gods.



Great fun, although probably slightly too easy for experienced arcade game players, Hellfire is produced for the 48K Spectrum by Melbourne House, Church Yard, Tring, Herts.

Price: £6.95

Game type: Arcade

Rating: 70%

GREAT SPACE RACE

LEGEND promised great things of **The Great Space Race.** Characters with animated faces; a program that goes one step beyond their last program, **Valhalla;** a development of the computer movie concept: all these were promised, and have been delivered. Unfortunately, it all goes wrong.

The game centres around delivery of the potent intoxicant, Natof, to ninety six different planets. Staff must be chosen, equipped and guided in order to deliver Natof to all planets as quickly as possible.

Choice of staff is important, and choices can be made based on the accompanying booklet, and on experience gained from past games. Some characters spend all their time asking whether they can fight pirates, and get very little work done. Others drink Natof too frequently, and have to be dried out at great expense. Others never ask you for guidance, and spend their time visiting the same planets.

The main problem is that, true to the computer movie formula, the game virtually plays itself, and all decisions will be made for you if you do not enter an answer quickly enough. As this is a long game, and bound to take over an hour to complete, it is easy to lose concentration for vital seconds, and thus miss your opportunity to make important decisions.

There is little to hold the attention in a game which plays itself.

The Great Space Race is produced for the 48K Spectrum by Legend, PO Box 435, Station Road, London E4.

Price: £14.95

Game type: Simulation

Rating: 45%

AFGHAN ATTACK

DESPITE the disclaimer in the introduction to **Afghan Attack** that the title is of no political significance, it seems likely that the title will probably discourage potential purchasers of any political persuasion.

The game itself is definitely aimed at the more war-mongering adventurer. The situation at the beginning of the game is that you and your troops have just been airlifted into Afghanistan. Your helicopter has been camouflaged and it is now up to you to make the decisions.

The game has several special features including real time simulation and the opportunity to communicate with allies. This communication is, however, fairly limited. Your sergeants and corporals are always happy to be told to open fire, or to do something suitably militaristic, but they are less enthusiastic about being helpful, being ordered around when it does not suit them, or simply indulging in lighthearted banter.

The vocabulary of the game appears to omit many of the most common adventure terms, and employs many words specific to the situation. This is, at first, difficult to adapt to, as war simulation is an unusual subject for an adventure.

Afghan Attack is produced for the 48K Spectrum by Southern Software, 6 The Hillway, Fareham, Hampshire.

Game type: Adventure

Rating: 45%

A PERFECT COUPLE

Just like ham and eggs and peaches and cream, Commodore User is the perfect companion for your 64 or Vic 20. Every month Commodore User is packed full of the latest new games reviews, special projects and business computing, plus the latest software charts, Tommy's Tips for your tricky computer problems, and much much more. Commodore User, the perfect magazine for Commodore owners, at your newsagent on the first of every month. All for only 95p.

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ELECTRONICS & COMPUTING

ROCKET MAN, FORTY NINER, ZX-TRICATOR

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Since the launch of the ZX-81 computer nothing in the ZX-81 world has equalled the excitement generated by the launch of **Forty Niner,** the first game produced by Software Farm featuring high-resolution graphics. Before that time, Software Farm had been known to computer owners for games such as **Asteroid** and **Gobblers.** Forty niner signalled a revolution in people's view of what could be achieved on the ZX-81. Since then the company's logo, the cosmic cockerel, has signalled the best ZX-81 software on the market.

To win a complete set of high resolution programs for the ZX-81, study the word square opposite. Hidden within it are ten words or phrases relating to Software Farm, their games, their logo, their graphics, and where their games might appear in *Sinclair Programs.* Words appear in straight lines either horizontally, vertically or diagonally. Some letters may be used in more than one word. We have shaded one word as an example. Simply find the other ten, shade them in on the grid, fill in your name and address, and send the completed form to: Sinclair Programs, EMAP, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU, to arrive before March 31st.

T	F	O	R	T	Y	N	I	N	E	R	S
O	Z	C	T	R	C	C	I	M	S	O	C
P	X	E	I	G	O	D	O	G	F	C	S
S	T	P	H	R	C	A	N	T	N	K	O
T	R	S	I	I	K	A	W	M	O	E	F
F	I	C	L	A	E	A	I	E	S	T	T
O	C	N	S	P	R	O	G	S	E	M	F
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M	A	S	T	E	R	O	I	D	H	U	Z

NAME .....

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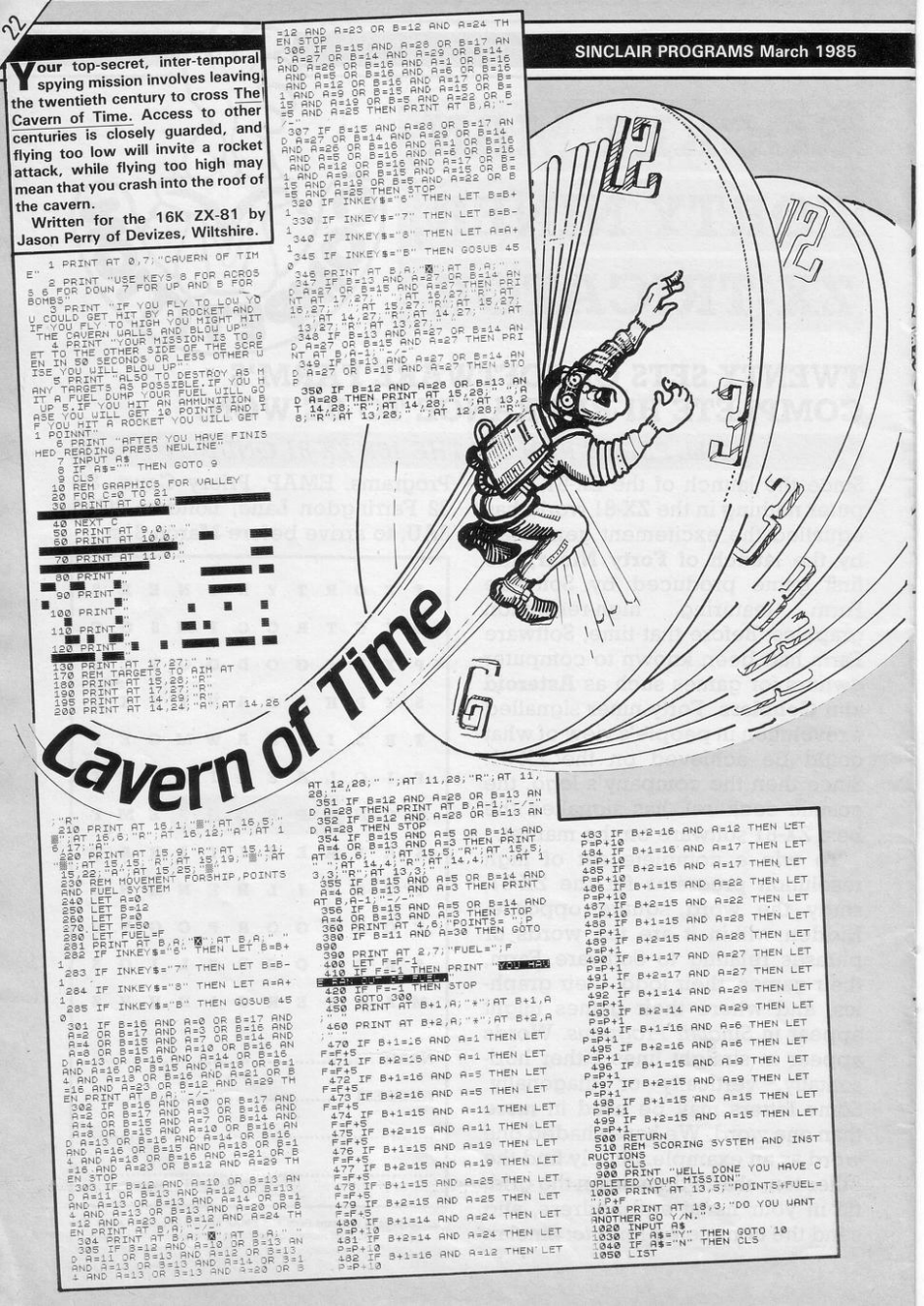
Employees of Software Farm and EMAP are not eligible to enter. The editor's decision in all matters concerning the competition is final.

Cavern of Time

Your top-secret, inter-temporal spying mission involves leaving the twentieth century to cross The Cavern of Time. Access to other centuries is closely guarded, and flying too low will invite a rocket attack, while flying too high may mean that you crash into the roof of the cavern.

Written for the 16K ZX-81 by Jason Perry of Devizes, Wiltshire.



```
E"
  1 PRINT AT 0,7;"CAVERN OF TIM
E"
  2 PRINT "USE KEYS 8 FOR ACROS
S 6 FOR DOWN 7 FOR UP AND 9 FOR
BOMBS"
  3 PRINT "IF YOU FLY TO LOW YO
U COULD GET HIT BY A ROCKET AND
IF YOU FLY TO HIGH YOU MIGHT HIT
THE CAVERN WALLS AND BLOW UP"
  4 PRINT "YOUR MISSION IS TO G
ET TO THE OTHER SIDE OF THE SCRE
EN IN 50 SECONDS OR LESS OTHERWI
ISE YOU WILL BLOW UP"
  5 PRINT "ALSO TO DESTROY AS M
ANY TARGETS AS POSSIBLE.IF YOU H
IT FUEL YOUR FUEL WILL GO
UP 5 IF YOU HIT AN AMMUNITION D
EPOSE YOU WILL GET 10 POINTS AND I
F YOU HIT A ROCKET YOU WILL GET
1 POINNT"
  6 PRINT "AFTER YOU HAVE FINIS
HED READING PRESS NEWLINE"
  7 INPUT A$
  8 IF A$="" THEN GOTO 9
  9 CLS
 10 REM GRAPHICS FOR VALLEY
 20 FOR C=0 TO 21
 30 PRINT AT C,0;"
 40 NEXT C
 50 PRINT AT 9,0;"
 60 PRINT AT 10,0;"
 70 PRINT AT 11,0;"
 80 PRINT "
 90 PRINT "
100 PRINT "
110 PRINT "
120 PRINT "
130 PRINT AT 17,27;"
170 REM TARGETS TO AIM AT
180 PRINT AT 15,28;"R"
190 PRINT AT 17,27;"R"
195 PRINT AT 14,29;"R"
200 PRINT AT 14,24;"R";AT 14,26
;"R"
 210 PRINT AT 18,1;"■";AT 16,5;"
■";AT 16,6;"R";AT 16,12;"A";AT 1
7,27;"A"
 220 PRINT AT 15,9;"R";AT 15,11;
"■";AT 15,18;"A";AT 15,19;"■";AT
15,22;"A";AT 15,25;"
 230 REM MOVEMENT FORSHIP,POINTS
AND FUEL SYSTEM
 240 LET A=0
 250 LET B=12
 260 LET P=0
 270 LET F=50
 280 LET FUEL=F
 281 PRINT AT B,A;"X";AT B,A;"
 282 IF INKEY$="6" THEN LET B=B+
1
 283 IF INKEY$="7" THEN LET B=B-
1
 284 IF INKEY$="8" THEN LET A=A+
1
 285 IF INKEY$="B" THEN GOSUB 45
0
 301 IF B=16 AND A=0 OR B=17 AND
A=2 OR B=17 AND A=5 OR B=16 AND
A=4 OR B=17 AND A=7 OR B=16 AN
D A=8 OR B=15 AND A=10 OR B=16
D A=13 OR B=16 AND A=14 OR B=15
D A=16 OR B=15 AND A=18 OR B=1
4 AND A=18 OR B=16 AND A=21 OR
 AND A=18 OR B=16 AND A=21 OR B
=15 AND A=23 OR B=12 AND A=29 TH
EN PRINT AT B,A;"-";AT B,A;"-"
 302 IF B=16 AND A=0 OR B=17 AND
A=2 OR B=17 AND A=5 OR B=16 AND
A=4 OR B=17 AND A=7 OR B=16 AN
D A=8 OR B=15 AND A=10 OR B=16
D A=13 OR B=16 AND A=14 OR B=15
D A=16 OR B=15 AND A=18 OR B=1
4 AND A=18 OR B=16 AND A=21 OR
 AND A=18 OR B=16 AND A=21 OR B
=15 AND A=23 OR B=12 AND A=29 TH
EN STOP
 303 IF B=12 AND A=10 OR B=13 AN
D A=11 OR B=13 AND A=12 OR B=13
AND A=13 OR B=13 AND A=14 OR B=1
4 AND A=13 OR B=13 AND A=20 OR B
=12 AND A=23 OR B=12 AND A=24 TH
EN PRINT AT B,A;"-";AT B,A;"
 304 PRINT AT B,A;"X";AT B,A;"
 305 IF B=13 AND A=10 OR B=13 AN
D A=11 OR B=13 AND A=12 OR B=13
AND A=13 OR B=13 AND A=11 OR B=1
4 AND A=13 OR B=13 AND A=20 OR B
=12 AND A=23 OR B=12 AND A=24 TH
EN PRINT AT B,A;"-";AT B,A;"-"
 306 IF B=15 AND A=28 OR B=17 AN
D A=27 OR B=14 AND A=29 OR B=14
AND A=28 OR B=16 AND A=1 OR B=16
 AND A=5 OR B=16 AND A=6 OR B=16
 AND A=8 OR B=16 AND A=17 OR B=
1 AND A=9 OR B=15 AND A=15 OR B=
15 AND A=19 OR B=5 AND A=28 OR B
=5 AND A=25 THEN PRINT AT B,A;"-
";
 307 IF B=15 AND A=28 OR B=17 AN
D A=27 OR B=14 AND A=29 OR B=14
AND A=28 OR B=16 AND A=1 OR B=16
 AND A=5 OR B=16 AND A=6 OR B=16
 AND A=8 OR B=16 AND A=17 OR B=
1 AND A=9 OR B=15 AND A=15 OR B
=15 AND A=19 OR B=5 AND A=22 OR B
=5 AND A=25 THEN STOP
 320 IF INKEY$="6" THEN LET B=B+
1
 330 IF INKEY$="7" THEN LET B=B-
1
 340 IF INKEY$="8" THEN LET A=A+
1
 345 IF INKEY$="B" THEN GOSUB 45
0
 346 PRINT AT B,A;"X";AT B,A;"
 347 IF B=13 AND A=28 OR B=14 AN
D A=27 OR B=15 AND A=29 THEN PRI
NT AT B,A-1;"-";AT 15,27;"R";AT
 13,27;"R";AT 15,27;"R";AT 15,27;
"R";AT 14,27;"R";AT 13,27;"
 348 IF B=13 AND A=28 OR B=14 AN
D A=27 OR B=15 AND A=29 THEN PRI
NT AT B,A-1;"-";AT 15,27;"R";AT
 13,27;"R";AT 15,27;"R";AT 15,27;
"R";AT 14,27;"R";AT 13,27;"
 349 IF B=13 AND A=28 OR B=14 AN
D A=27 OR B=15 AND A=29 THEN STO
P
 350 IF B=12 AND A=28 OR B=13 AN
D A=28 THEN PRINT AT 15,28;" ";A
T 13,28;"R";AT 14,28;" ";AT 12,2
8;"R";AT 13,28;"
 351 IF B=12 AND A=28 OR B=13 AN
D A=28 THEN PRINT AT B,A-1;"-";"
";AT 12,28;" ";AT 11,28;"R";AT 11,
28;"
 352 IF B=12 AND A=28 OR B=13 AN
D A=28 THEN STOP
 354 IF B=15 AND A=5 OR B=14 AND
A=4 OR B=13 AND A=3 THEN PRINT
AT 16,6;" ";AT 15,5;"R";AT 15,5;
AT 16,6;" ";AT 14,4;"R";AT 14,4;"
";AT 13,3;"R";AT 13,3;
 355 IF B=15 AND A=5 OR B=14 AND
A=4 OR B=13 AND A=3 THEN PRINT
AT B,A-1;"-";"-"
 356 IF B=15 AND A=5 OR B=14 AND
A=4 OR B=13 AND A=3 THEN STOP
 360 PRINT AT 4,6;"POINTS=";P
 380 IF B=11 AND A=30 THEN GOTO
900
 390 PRINT AT 2,7;"FUEL=";F
 400 LET F=F-1
 410 IF F=-1 THEN PRINT "YOU HAV
E RUN OUT OF FUEL"
 420 IF F=-1 THEN STOP
 430 GOTO 300
 450 PRINT AT B+1,A;"*";AT B+1,A
;"
 460 PRINT AT B+2,A;"*";AT B+2,A
;"
 470 IF B+1=16 AND A=1 THEN LET
F=F+5
 471 IF B+2=15 AND A=1 THEN LET
F=F+5
 472 IF B+1=16 AND A=5 THEN LET
F=F+5
 473 IF B+2=16 AND A=5 THEN LET
F=F+5
 474 IF B+1=15 AND A=11 THEN LET
F=F+5
 475 IF B+2=15 AND A=11 THEN LET
F=F+5
 476 IF B+1=15 AND A=19 THEN LET
F=F+5
 477 IF B+2=15 AND A=19 THEN LET
F=F+5
 478 IF B+1=15 AND A=25 THEN LET
F=F+5
 479 IF B+2=15 AND A=25 THEN LET
F=F+5
 480 IF B+1=14 AND A=24 THEN LET
P=P+10
 481 IF B+2=14 AND A=24 THEN LET
P=P+10
 482 IF B+1=16 AND A=12 THEN LET
P=P+10
 483 IF B+2=16 AND A=12 THEN LET
P=P+10
 484 IF B+1=16 AND A=17 THEN LET
P=P+10
 485 IF B+2=16 AND A=17 THEN LET
P=P+10
 486 IF B+1=15 AND A=22 THEN LET
P=P+10
 487 IF B+2=15 AND A=22 THEN LET
P=P+10
 488 IF B+1=15 AND A=28 THEN LET
P=P+1
 489 IF B+2=15 AND A=28 THEN LET
P=P+1
 490 IF B+1=17 AND A=27 THEN LET
P=P+1
 491 IF B+2=17 AND A=27 THEN LET
P=P+1
 492 IF B+1=14 AND A=29 THEN LET
P=P+1
 493 IF B+2=14 AND A=29 THEN LET
P=P+1
 494 IF B+1=16 AND A=6 THEN LET
P=P+1
 495 IF B+2=16 AND A=6 THEN LET
P=P+1
 496 IF B+1=15 AND A=9 THEN LET
P=P+1
 497 IF B+2=15 AND A=9 THEN LET
P=P+1
 498 IF B+1=15 AND A=15 THEN LET
P=P+1
 499 IF B+2=15 AND A=15 THEN LET
P=P+1
 500 RETURN
 510 REM SCORING SYSTEM AND INST
RUCTIONS
 890 CLS
 900 PRINT "WELL DONE YOU HAVE C
OMPLETED YOUR MISSION"
1000 PRINT AT 13,5;"POINTS=FUEL=
";P+F
1010 PRINT AT 18,3;"DO YOU WANT
ANOTHER GO Y/N."
1020 INPUT A$
1030 IF A$="Y" THEN GOTO 10
1040 IF A$="N" THEN CLS
1050 LIST
```

Smooth screen scrolling in machine code

In part two of his series dealing with m/c Tony Rickwood looks at simple commands

IN THE last issue, I introduced some of the background concepts of machine code programming. We are now ready to make a start on practical machine code by looking at two short routines for scrolling the display to both sides of the screen.

Take a quick look at the two routines listed in this article and you will see how just a few machine code instructions can achieve a smooth scroll, pixel by pixel. First, a few notes about the format which will be used to present all examples in the series. Each program is presented in two parts: a Basic program followed by an Assembler listing. To use a routine, it is not essential for you to understand the assembler or to use an assembler to enter it. All machine code is contained in and entered into memory by the Basic program which will also demonstrate the routine in execution. It will even save the machine code for you to build up a dedicated toolkit of routines for you to call from your own Basic programs.

The assembler listing is there to help you understand what is being done by the numbers POKEd into memory by the Basic program. Much of what I will have to say in this series will teach you machine code by explaining the assembler instructions. The important thing, though, is to get the routine running first from the Basic program and then to settle down to understand how it works.

SCROLL RIGHT: BASIC

First, enter and run the Basic listing for Program one. Provided you enter the data correctly, you will see a screen listing of the program disappearing to the right.

Program One: Basic

```
 10 REM PROGRAM ONE- RIGHT PIXE
L SCROLL
 20 LET s=0: FOR i=64000 TO 640
23: READ n: POKE i,n: LET s=s+n:
 NEXT i
 30 READ sum: IF s <> sum THEN
 PRINT "error in data entry - re
typeline 40": STOP
 40 DATA 6,0,197,33,255,63,6,19
2,197,175,6,32,35,203,30,16,251,
193,16,244,193,16,239,201,2795
 50 PRINT "data entry o.k.""no
w running m/c": PAUSE 100
 60 CLEAR 63999: LIST : RANDOMI
ZE  USR 64000: STOP
```

Line 10 does most of the work by reading the machine code as decimal numbers and POKEing them into a part of spare memory. 24 bytes of spare memory from locations 64000 to 64023 are used in this case. What do we mean by spare memory? Page 165 of your Spectrum manual gives you a complete memory map. The important things to find out are:

a) How high can a spare byte be? When you first switch on, RAMTOP (the top of available RAM) is set to the byte immediately preceding the part of memory reserved for UDG's. This can be found by:

PRINT PEEK 23730 + 256*PEEK 23731

which evaluates the system variable called RAMTOP (see page 176 of the manual). On power up, this will be 65367 for a 48K machine and 32599 for a 16K machine.

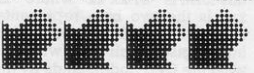
b) How low can a spare byte be? This will depend mainly on the size of any Basic program and variables, and can be found by:

PRINT PEEK 23653 + 256*PEEK 23654

which evaluates the system variable called STKEND.

Subtracting high and low bytes gives you the number of spare bytes so you can change the numbers in line 20 to suit your own requirements (and machine i.e. 16 or 48K).

Line 30 checks your data entry in the DATA statement (line 40), as an attempt to execute defective machine code will often



cause the machine to crash. Line 60 executes the routine following a CLEAR command. This lowers RAMTOP to ensure that the routine is not erased when NEW is pressed, or another Basic program is loaded (remember that you will often want to use the same machine code routine with different Basic programs). The LIST is necessary to give you a display to be scrolled when the routine is executed by RANDOMIZE USR 64000.

Program One: Assembler

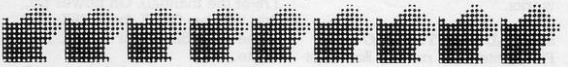
```
                10 ;ASSEMBLER FOR PROGRAM 1- RIGHT PIXEL SCROLL
                20 ;
0600            30          LD   B,0        ;LOOP THROUGH
C5              40 PIXEL    PUSH BC         ;256 PIXEL COLUMNS
21FF3F          50          LD   HL,16383 ;1 LESS THAN DF START
06C0            60          LD   B,192      ;LOOP THROUGH
C5              70 ROW      PUSH BC         ;192 PIXEL ROWS
AF              80          XOR  A          ;SET CARRY TO ZERO
0620            90          LD   B,32       ;LOOP THROUGH
23             100 COL      INC  HL         ;32 BYTE COLUMNS
CB1E           110          RR   (HL)       ;ROTATE EACH BYTE
10FB           120          DJNZ COL        ;END OF COLUMN LOOP
C1             130          POP  BC
10F4           140          DJNZ ROW        ;END OF ROW LOOP
C1             150          POP  BC
10EB           160          DJNZ PIXEL      ;END OF PIXEL LOOP
C9             170          RET  ;RETURN TO BASIC
```

SCROLLING RIGHT: ASSEMBLER

This has been prepared using one of the better commercially available assembler programs. To reiterate, you do not have to enter this unless you have an assembler of your own and wish to experiment with different ways of doing the same job (a good way

continued

to make learning machine code faster and more enjoyable). If you do not like the idea of pre-cooked machine code, and do not own an assembler, you may wish to use a Hex Loader. There are many such utility programs listed in books and magazines which you can key in in Basic. These will accept the hexadecmial equivalents to the Z80 mnemonics as they appear in assembler listings, convert them to decimal numbers, and POKE them into memory. If you wish to use a hex loader then, instead of



my Basic interface programs, the hex equivalents are given in my assembler listings (first column).

The second column shows assembler line numbers which I will refer to frequently for explanatory notes. These are followed by the assembler instruction. Anything preceded by a semi-colon is like a Basic REMark. To see the relationship between Assembler, hexadecimal equivalents and the decimal numbers you have entered in the Basic program, have a close look at line 50 : LD HL,16383. The hex equivalent of a Z80 instruction of this form is "21 xx xx" where "xx xx" is the two byte representation of the number to be loaded into register pair HL (which is what the CPU understands by the hex code "21"). In machine code terminology, a number in the range 0 to 65535 has to be split into a "high order" and a "low order" byte (HOB and LOB). HOB is the number of times a number will divide by 256 and LOB is the remainder. Thus: HOB = INT(n/256) and LOB = n – 256*INT(n/256). The HOB and LOB for 16382 are 63 and 255 respectively (in hex, 3F and FF).

You may recall from a previous article on Numbers that the LOB is stored first, so this convention is also used with machine code instructions. Therefore, the instruction we are examining here becomes "21 FF 3F" in hex. In decimal, this is "33 255 63," as you will find it in the Basic listing. When running, the CPU will automatically interpret the binary representation of "33" (BIN 0100001) as instructing it to load register H with the binary form for "63" and register L with that for "255".

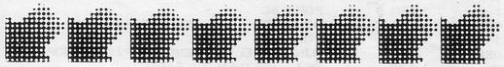
Now we can start to understand how this little routine hangs together, but do make sure you properly understand the previous paragraph as it is fundamental to all machine code programming.

Firstly, we must define what the routine has to do. This can be simply stated as "moves the whole screen to the right, pixel by pixel". We can visualise a display as a matrix of dots (black or white) which spread 256 wide (32 columns *B) and 192 deep (24 rows *8). Next, we must decide how this is to be done. The method I have used is to work through each consecutive byte of the display file, working with each of the 32 bytes (representing 32 columns) across the screen before moving down to the next pixel row. Remember that there

are 192 pixel rows and it is these rows (not the 24 character rows) with which we will be dealing.

The diplay file which is used to store all 6144 bytes (32*192) of data which make up the display starts at location 16384 and ends at 22527. Our scroll routine has to change the bit pattern of all these bytes, not just once (as this will only give a single pixel move for the whole screen) but 256 times.

For the Basic programmer, this immediately brings to mind the concept of nested FOR/NEXT loops. There are three such loops



in this routine, labelled PIXEL, ROW and COL (for COLumn). The outer PIXEL loop serves to repeat for 256 pixel moves (so that the leftmost pixels are the last to disappear). The middle ROW loop works down through 192 rows and the inner COL loop works through the 32 bytes in each row. We can break down our analysis by looking at what goes on in the inner loop first and working outwards.

The COLumn Loop: The lines

of interest here are numbered 80 to 120. Two are to initialise this loop, starting with XOR A. This stands for "eXclusive OR on register A" and represents one of three commonly found logical operators (OR, AND, XOR). We shall be seeing much more of all three in future examples. For the moment all you need to know is that this instruction has the important property of clearing the carry flag. You will see how the carry flag is used to hold the bit which is forced out of each byte to become the first bit of the next byte. Remember that we are at the start of a pixel row at this point in the routine. To ensure that the last bit of the previous row does not become the first bit of the current row, it is therefore vital to reset the carry flag to zero.

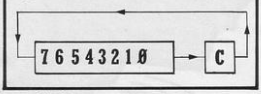
"LD B,32" means "Load Register B with the number 32". I explained the principle of addressing in the previous article. You need to know that there are several types of addressing. The type being used here is called immediate addressing. In plain language, it means that register B can be loaded immediately with a number instead of having to look up a value somewhere in memory. In Basic, an analogy would be let B=32 instead of LET A=32:LET B=A. The command sets up a loop counter similar to that of a FOR B=32 to 1 STEP –1 and covers the 32 bytes (for each column) in a row.

Line 100 is the first instruction to be executed in the inner loop proper. The part which is converted to machine code by the assembler is "INC HL", as "COL" is just a label to mark the start of the loop. "INC HL" is read as

"INCrement the contents of the HL register pair by 1". As we will see, HL is used to point to each consecutive byte of the display file.

The real work in this routine is done by line 110. "RR (HL)" which is read as "Rotate Right the contents of the address pointed to by HL (i.e. the current byte of the display file)". This is an example of an instruction which uses indirect addressing. Here,

Figure One



the CPU is working indirectly on a memory location to which the HL register pair is pointing. The appearance of brackets in machine code can generally be read in this way. Why do we not use direct addressing by calling in the number to be operated on, doing the operation, and putting it back again? We could, but this would require three instructions. So indirect addressing makes machine code more compact and efficient.

Figure one shows how "RR" works on a byte of data. Used once, it moves bit 7 to bit 6, bit 6 to bit 5 etc, down to bit 0 which is moved to figure 1 occupy the carry flag. What was the carry flag is moved to bit 7. Thus, as we move across the 32 bytes of a pixel row, each byte is moved one pixel to the right, with the carry flag holding the overflow

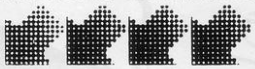
bit ready to start the next byte.

The COLumn loop is terminated by Line 120, "DJNZ COL" which reads as "Decrement the B Register and Jump to label COL if the contents of B are Non Zero". DJNZ must always be used in conjunction with B holding the loop counter and gives us the nearest machine code equivalent of the FOR/NEXT loop. The assembler program automatically works out which instruction has been assigned the label COL and enters an offset (number of steps backward) into the machine code for DJNZ.

The ROW loop: This is initialised by line 50, which points HL to the byte immediately below the start of the display file so that, the first time INC HL is executed, HL is pointing to the start of the display. Line 60 sets up the loop counter for 192 rows.

Now we hit a small snag. As we have seen, all DJNZ loops must use the B register as the loop counter so, for nested loops, we must be able to store an outer loop counter while an inner loop is being processed. We could load B into another register and load it back again, although there are two instructions which are more compact. These are "PUSH BC" and "POP BC".

Look at your Spectrum manual again, and you will see a chunk of memory called the stack. This is a place where numbers can be stacked on top of one another. It



is a convenient place for the machine code programmer to store numbers temporarily, without having to worry about addressing.

To use the stack, a number is PUSHed onto it from a register pair, and POPped off again when required. For example, suppose the CPU is about to start on the 50th row. Line 70 will PUSH the number 50 (along with whatever register C is holding — this is irrelevant in this example) onto the stack. It can then work through the COL loop with B=1 TO 32. The B=50 is then POPped back off the stack, and the DJNZ in line 140 decrements it to 49, ready for the next row.

The PIXEL loop: starts at line 40 and ends on line 160. The same principles apply as for the inner loops, except that here we are executing the single pixel move (for whole screen), 256 times. You need not worry that all the PUSHing and POPping will confuse matters because the CPU automatically works with the stack on a first in, last out basis.

Program Two: Assembler

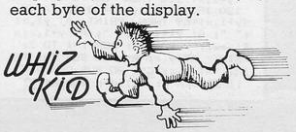
```
  10 REM PROGRAM TWO - LEFT PIXE
L SCROLL
  20 LET s=0: FOR i=64000 TO 640
23: READ n: POKE i,n: LET s=s+n
: NEXT i
  30 READ sum: IF s <> sum THEN
 PRINT "ERROR in DATA ENTRY - RE
TYPE LINE 40": STOP
  40 DATA 6,0,197,33,0,88,6,192,
197,175,6,32,43,203,22,16,251,19
3,16,244,193,14,235,201,2565
  50 PRINT "data entry o.k.""no
w running m/c": PAUSE 100
  60 CLEAR 63999: LIST : RANDOMI
ZE  USR 64000: STOP
```

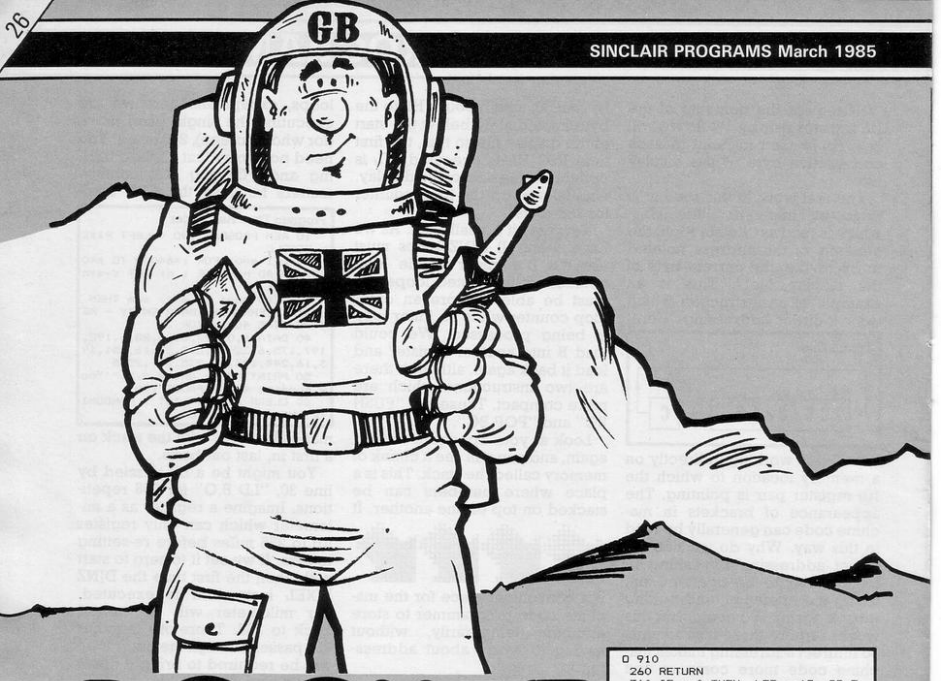
You might be a bit puzzled by line 30, "LD B,O" for 256 repetitions. Imagine a register as a milometer which can only register up to 255 miles before re-setting to zero. If we set it to zero to start with, then the first time the DJNZ PIXEL instruction is executed, our milometer will be turned back to 255. Therefore, another 255 passes through the outer loop will be required to bring B down to zero and finally allow the CPU to exit back to Basic through the RETurn instruction.

Program 2 lists the routine for a *left* pixel scroll. As you would expect, the assembler listing is very similar to Program One except that now we are working backward through the display file. Therefore, we need to DEcrement HL (from the end of the display file) and "Rotate Left" (RL) each byte of the display.

Program Two: Basic

```
            10 ;ASSEMBLER FOR PROGRAM 2- LEFT PIXEL SCROLL
            20 ;
0600        30          LD   B,0
C5          40 PIXEL    PUSH BC
210058      50          LD   HL,22528 ;1 MORE THAN DF END
06C0        60          LD   B,192
C5          70 ROW      PUSH BC
AF          80          XOR  A
0620        90          LD   B,32
2B         100 COL      DEC  HL
CB16       110          RL   (HL)
10FB       120          DJNZ COL
C1         130          POP  BC
10F4       140          DJNZ ROW
C1         150          POP  BC
10EB       160          DJNZ PIXEL
C9         170          RET
```



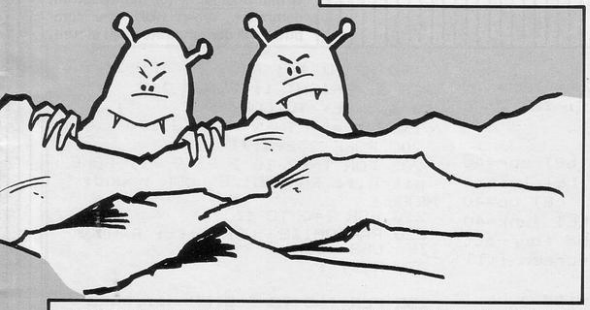


ROCKET MAN

```
  1 LET s=0: LET h=0
  5 INVERSE 0: BRIGHT 0: PAPER
0: BORDER 0: INK 7: CLS : RESTOR
E : GO TO 6000
 10 FOR k=60 TO 40 STEP -4: BEE
P .002,k: BEEP .002,k-10
 11 NEXT k: RETURN
 20 FOR k=40 TO 60 STEP 4: BEEP
.002,k: BEEP .002,k-10: NEXT k
 25 RETURN
 100 IF  ATTR (y,x)<7 OR  ATTR (
y+1,x)<7 THEN  LET y=y1: LET x=x
1: GO TO 1071
 110 IF  ATTR (y,x)=68 OR  ATTR
(y+1,x)=68 THEN  BEEP .1,55: LET
 s=s+25: PRINT #0; AT 1,6- LEN
STR$ s;s: GO TO 1061
 115 IF  ATTR (y,x)>128 OR  ATTR
 (y+1,x)>128 THEN  GO TO 300
 120 IF  ATTR (y,x)=69 OR  ATTR
(y+1,x)=69 THEN  PRINT  AT y1,x1
;" "; AT y1+1,x1;" "; AT y+1,x;m
$(a+2): BORDER 1: FOR i=1 TO 2:
PRINT  AT y,x;"A": GO SUB 20: PR
INT  AT y,x;"C": GO SUB 20: NEXT
 i: BORDER 0: LET d=d-20: PRINT
#0; AT 1,28;"  "; AT 1,28;d: IF
d=0 THEN  GO TO 8700
 122 IF p=y AND q=x OR p=y+1 AND
 q=x THEN  GO TO 910
 123 GO TO 900
 210 IF x<27 AND a=1 THEN  PRINT
  INK 6; AT y,x+1;"IIII": GO SUB
 10: PRINT  AT y,x+1;"  "
 220 IF x>4 AND a=2 THEN  PRINT
 INK 6; AT y,x-4;"IIII": GO SUB
10: PRINT  AT y,x-4;"  "
 230 IF  ATTR (e,f)=7 THEN  GO S
UB 9000: FOR i=e TO 21: PRINT  O
VER 1; INK 8; PAPER 8; BRIGHT 8;
 FLASH 8; AT i,f;"E": BEEP .002,
35-i: BEEP .002,40-i: PRINT  OVE
R 1; INK 8; PAPER 8; BRIGHT 8; F
LASH 8; AT i,f;"E": NEXT i: GO T
O 900
 240 IF  ATTR (p,q)=7 THEN  GO S
UB 9000: FOR i=p TO 21: PRINT  O
VER 1; INK 8; PAPER 8; BRIGHT 8;
 FLASH 8; AT i,q;"G": BEEP .002,
35-i: BEEP .002,40-i: PRINT  OVE
R 1; INK 8; PAPER 8; BRIGHT 8; F
LASH 8; AT i,q;"G": NEXT i: GO T
O 910
 260 RETURN
 310 IF y=0 THEN  LET y=19: GO T
O 4000
 320 IF y=20 THEN  LET y=1: GO T
O 4000
 330 IF x=0 THEN  LET x=30: GO T
O 4000
 340 IF x=31 THEN  LET x=1: GO T
O 4000
 900 RANDOMIZE : PRINT  AT e,f;"
 "; LET f=1+ INT ( RND *30): LET
 e=1+ INT ( RND *20): PRINT  AT
e,f; INK 5; BRIGHT 1;"E": GO TO
911
 910 RANDOMIZE : PRINT  AT p,q;"
 "; LET q=1+ INT ( RND *30): LET
 p=1+ INT ( RND *20): PRINT  AT
p,q; INK 5; BRIGHT 1;"G"
 920 PRINT  AT y,x;" "; AT y+1,x
;" "; AT y1,x1;" "; AT y1+1,x1;"
 "
1000 FOR j=1 TO 4
1020 LET y1=y: LET x1=x
1030 LET y=y+(( INKEY$ ="w")-( I
NKEY$ ="2"))
1040 IF  INKEY$ ="o" THEN  LET x
=x+1: LET a=1
1041 IF  INKEY$ ="9" THEN  LET x
=x-1: LET a=2
1060 IF  ATTR (y,x) <> 7 OR  ATT
R (y+1,x) <> 7 THEN  GO TO 100
1070 PRINT  AT y1,x1;" "; AT y1+
1,x1;" "; AT y,x;m$(a); AT y+1,x
;m$(a+2)
1090 IF  INKEY$ ="m" THEN  GO SU
B 200
1110 IF j=2 OR j=4 THEN  GO TO 1
142
1120 LET e1=e: LET f1=f
1125 IF  RND >.8 THEN  LET e=e+(
(y<e)-(y>e)): GO TO 1131
1130 LET e=e+((y>e)-(y<e))
1131 LET f=f+2*((x>f)-(x<f))
1135 IF  ATTR (e,f) <> 7 THEN  L
ET e=e1: LET f=f1
1140 PRINT  AT e1,f1;" "; AT e,f
; INK 5; BRIGHT 1;b$(j)
1141 GO TO 1171
```

Explore the moon caverns to find and collect as many green crystals as possible. Beware of the aliens who will rob you of your air supply. You are equipped with a rocket pack and a laser gun. The gun can be used to destroy the aliens or to shoot a path through the obstacles.

Rocket Man was written for the 16K Spectrum by T. Sherwood of West Bromwich, West Midlands.



```
4110 FOR i=1 TO 5: LET k=1+ INT
 ( RND *19): LET l=1+ INT ( RND *
30): PRINT  INK 2+ INT ( RND *5)
; AT k,l;"J"; AT k+1,l;"J": NEXT
 i
4115 FOR i=1 TO 5: LET k=1+ INT
 ( RND *20): LET l=1+ INT ( RND *
29): PRINT  INK 2+ INT ( RND *5)
; AT k,l;"II": NEXT i
4199 GO TO 4240
4200 FOR i=1 TO 5: LET k=1+ INT
 ( RND *20): LET l=1+ INT ( RND *
20): PRINT  INK 2+ INT ( RND *5)
; AT k,l;"KLLLL(ig8)LLLLK": NEXT
 i
4205 FOR i=1 TO 6: LET k=1+ INT
 ( RND *18): LET l=1+ INT ( RND *
30): PRINT  INK 2+ INT ( RND *5)
; AT k,l;"M"; AT k+1,l;"M"; AT k
+2,l;"M": NEXT i
4219 GO TO 4240

4220 FOR i=1 TO 5: LET k=1+ INT
 ( RND *20): LET l=1+ INT ( RND *
20): PRINT  INK 2+ INT ( RND *5)
; AT k,l;"LL(2*ig8)JJ(2*ig8)LL":
 NEXT i
4225 FOR i=1 TO 6: LET k=1+ INT
 ( RND *18): LET l=1+ INT ( RND *
30): PRINT  INK 2+ INT ( RND *5)

; AT k,l;"L"; AT k+1,l;"L": AT k
+2,l;"L": NEXT i
4240 INK 5: BRIGHT 1: PRINT  AT
p,q;"H": FOR i=1 TO 4: PRINT  AT
 2+ INT ( RND *17),2+ INT ( RND
*27);"E"; AT 2+ INT ( RND *17),2
+ INT ( RND *27);"G": NEXT i
4250 INK 4: PRINT  AT 1+ INT ( R
ND *20),1+ INT ( RND *30);"N"
4400 INK 7: BRIGHT 0: GO TO 900

6005 PAPER 3: PRINT "
                     ROCKET MA
N IN THE MOONCAVES
                    "
6009 PAPER 2: PRINT  AT 5,8;" YO
UR MISSION : "
6010 PRINT '" Explore the moon c
averns to     find and collect a
s many green  crystals as possib
le.           "
6012 PRINT '" Beware of the alie
ns who will   rob you of your ai
r supply.     "
6014 PRINT '" You are equipped w
ith a rocket  pack and laser gun
.             "
6016 PRINT " The gun can be used
 to destroy   the aliens or to sh
oot a path    through the obstacl
es.           "
6018 PRINT '" The flashing doors
 lead to      other caverns.
                ": PAPER 0
7990 IF  PEEK  USR "a"=60 THEN
GO TO 8005
8000 FOR i= USR "a" TO  USR "n"+
7
8002 READ j: POKE i,j: NEXT i
8005 DATA 60,62,71,71,62,28,63,1
24,162,62,62,54,108,108,108,216,
60,124,226,226,124,56,252,62,69,
124,124,108,54,54,54,27
8007 DATA 255,24,126,255,153,255
,66,60,24,24,126,255,153,255,66,
60,60,126,219,255,195,195,126,60
,60,126,219,255,255,126,60,0
8009 DATA 0,0,106,239,255,218,0,
0,24,60,24,60,12,56,60,28,24,60,
102,195,195,102,60,24,255,231,0,
0,0,24,255,255
8020 PRINT  INK 4; PAPER 2; AT 9
,23;"N N N N"
8030 FOR i=0 TO 40 STEP 2: BEEP
.005,i: BEEP .005,i+5: BEEP .005
,i+10: NEXT i
8045 PRINT #0; AT 1,4; PAPER 3;"
Press key M to continue "
8046 LET t=0: LET u=1
8047 IF  INKEY$ ="m" THEN  GO TO
 8051
8048 PRINT  AT 4,t;" "; AT 13,31
-t;" ": LET t=t+u: PRINT  INK 5;
 BRIGHT 1; AT 4,t;"E"; AT 13,31-
t;"G": PAUSE 15: PRINT  INK 5; B
RIGHT 1; AT 4,t;"F"; AT 13,31-t;
"H": PAUSE 15: IF t=31 OR t=0 TH
EN  LET u=-u
8049 GO TO 8047
8051 IF  INKEY$ <> "" THEN  GO
TO 8051

8056 CLS :  LET i=12
8061 INK 5: PRINT  AT 10,i;"UP
  2": PRINT  TAB i;"DOWN  W": PR
INT  TAB i;"LEFT  9": PRINT  TAB
 i;"RIGHT 0": PRINT  TAB i;"FIRE
  M": INK 7
8065 PRINT '' TAB 6;"PRESS KEY M
 TO START"
8075 FOR i=23 TO 0 STEP -1: PRIN
T  AT 6,i;"A (iC:iO:iN:iT:iR:iO:
iL)"; AT 7,i;"B (iK:iE:iY:iS:3*i
g8)": IF  INKEY$ ="m" THEN  GO T
O B090
8077 PAUSE 20: PRINT  AT 6,i;"
       "; AT 7,i;"       ": NE
XT i: GO TO 8075
8090 IF  INKEY$  <> "" THEN  GO
TO 8090
8100 LET a=1: LET m$="CADB": LET
 b$="EGFH"
8400 LET d=100: LET x=1: LET y=1
0: LET y1=y: LET x1=x
8405 IF s>h THEN  LET h=s
8410 LET s=0: LET e=1+ INT ( RND
 *20): LET f=30: LET p=1+ INT (
RND *20): LET q=1+ INT ( RND *30
)
8600 LET j=1: GO TO 4000
8701 IF s>h THEN  PRINT  AT 19,1
; FLASH 1;" NEW HIGH "; AT 20,1;
" SCORE   "
8705 INK 5: INVERSE 1: PRINT  AT
 9,0;"************************
*******C     AIR SUPPLY EXHAUSTED
    A**D
    B**"
8706 PRINT "*  PRESS KEY M FOR N
EXT GAME  ********************
**********": INK 7: INVERSE 0

8710 FOR i=65 TO 0 STEP -5: BEEP
 .005,i: BEEP .005,i: BEEP .005,
i-5: BEEP .005,i-5: BEEP .005,i-
10: BEEP .005,i-10: NEXT i
8712 IF  INKEY$  <> "m" THEN  GO
 TO 8712
8713 IF  INKEY$  <> "" THEN  GO
TO 8713
8750 GO TO 5

9000 FOR i=7 TO 0 STEP -1: BORDE
R i: BEEP .005,i*3: NEXT i: LET
s=s+10: PRINT #0; AT 1,6- LEN  S
TR$ s;s: RETURN
9200 DATA 66,195,66,195,66,195,6
6,195
9210 DATA 0,16,40,68,186,68,40,1
6
```

Special fx

A whole variety of colourful screen effects are gathered within Special fx for the Spectrum computer. When RUN, the computer will demonstrate each in turn.

```
  0> REM Special fx
       @1984 Ian Brownridge
  1 BORDER 0: PAPER 0: INK 7: B
RIGHT 1: CLS
  2 GO TO 9000
  5 LET pitch=40136: LET dur=40
138: LET sound=40132: LET left=4
0000: LET right=40051: LET up=40
090: LET down=40111: LET junk=40
039: REM Initialise the four att
ribute scrolls  and screen fill
 routines
 10 REM fill screen with junk
 15 LET j=0
 20 RANDOMIZE  USR junk
 30 POKE 40044,j: REM move poin
ter up through the ROM
 40 LET j=j+1
 50 IF j>30 THEN  LET j=0: REM
check to make sure pointer does
not find group of similar bytes
thus keeping random effect
 60 IF  INKEY$ ="" THEN  GO TO
20
 65 POKE pitch,15: RANDOMIZE  U
SR sound
 70 POKE 23296,71: REM restore
paper colour
 80 FOR f=1 TO 16: REM call rou
tines 16 times to clear screen
 90 RANDOMIZE  USR left: RANDOM
IZE  USR right: RANDOMIZE  USR u
p: RANDOMIZE  USR down
 100 NEXT f
 110 REM stripes
 115 FOR g=0 TO 5: REM call rout
ine six times
 120 LET x=0
 130 FOR f=0 TO 16
 140 POKE 23296,x
 150 LET x=x+8
 160 IF x>56 THEN  LET x=0
 170 RANDOMIZE  USR left: RANDOM
IZE  USR right
 180 NEXT f
 185 NEXT g
 190 PRINT #0; AT 1,0; INK 2; PA
PER 6; BRIGHT 1; FLASH 1;"  PRE
SS ANY KEY TO CONTINUE     ": IF
 INKEY$ ="" THEN  GO TO 190
 200 POKE 23296,71
 205 FOR f=12 TO 2 STEP -1: POKE
 pitch,f: RANDOMIZE  USR sound:
NEXT f
 210 FOR f=0 TO 16
 220 RANDOMIZE  USR left: RANDOM
IZE  USR right
 230 NEXT f

 235 FOR f=8 TO 2 STEP -1: POKE
pitch,f: RANDOMIZE  USR sound: N
EXT f
 240 REM more stripes
 245 FOR g=0 TO 5: REM call rout
ine six times
 250 LET x=0
 260 FOR f=1 TO 13
 270 POKE 23296,x
 280 LET x=x+8
 290 IF x>56 THEN  LET x=0
 300 RANDOMIZE  USR up: RANDOMIZ
E  USR down
 310 NEXT f
 320 NEXT g
 330 IF  INKEY$ ="" THEN  GO TO
330
 340 POKE 23296,71
 345 FOR g=1 TO 3: FOR f=6 TO 2
STEP -1: POKE pitch,f: RANDOMIZE
 USR sound: NEXT f: NEXT g
 350 FOR f=0 TO 13
 360 RANDOMIZE  USR up: RANDOMIZ
E  USR down
 370 NEXT f
 380 REM part screen attribute s
crolls
 390 LET x=79
 395 POKE 23296,x
 400 FOR f=1 TO 16
 410 RANDOMIZE  USR up: RANDOMIZ
E  USR left
 420 NEXT f
 425 PAUSE 10: PAUSE 0
```

Effects

The listing is clearly labelled with REM statements which allow for removal of individual routines for use in your own programs.

```
  428 FOR f=5 TO 10: FOR g=6 TO 2
  STEP -1: POKE pitch,g: POKE dur
 ,f: RANDOMIZE  USR sound: NEXT g
 : NEXT f
  430 LET x=x+8
  440 POKE 23296,x
  450 FOR f=0 TO 16
  460 RANDOMIZE  USR up: RANDOMIZ
E  USR right
  470 NEXT f
  475 PAUSE 0
  477 FOR f=1 TO 3: FOR g=6 TO 2
STEP -1: POKE pitch,g: POKE dur,
f: RANDOMIZE  USR sound: NEXT g:
 NEXT f
  480 LET x=x+8
  490 POKE 23296,x
  500 FOR f=0 TO 16
  510 RANDOMIZE  USR down: RANDOM
IZE  USR left
  520 NEXT f
  525 PAUSE 0
  527 POKE dur,1: POKE pitch,2: F
OR f=1 TO 10: RANDOMIZE  USR sou
nd: NEXT f
  530 LET x=x+8
  540 POKE 23296,x
  550 FOR f=0 TO 16
  560 RANDOMIZE  USR down: RANDOM
IZE  USR right
  570 NEXT f
  575 PAUSE 0
  580 POKE pitch,12: POKE dur,30:
 RANDOMIZE  USR sound
  590 REM Flag
  600 LET x=0
  610 FOR f=0 TO 60
  620 LET x=x+8
  630 IF x>128 THEN  LET x=0
  640 POKE 23296,x
  650 RANDOMIZE  USR up: RANDOMIZ
E  USR down: RANDOMIZE  USR left
: RANDOMIZE  USR right
  660 NEXT f
  670 FOR f=1 TO 5: RANDOMIZE  US
R sound: NEXT f
  680 POKE 23296,71
  690 FOR f=0 TO 16
  700 RANDOMIZE  USR up: RANDOMIZ
E  USR down: RANDOMIZE  USR left
: RANDOMIZE  USR right
  710 NEXT f
  720 PRINT  AT 11,8;"Thats all f
olks !!!"
  999 STOP
9000 CLEAR 39999: RESTORE 9100:
FOR a=40000 TO 40146
9005 PRINT  AT 11,8;"Poking in m
/c now"
9010 READ b
9020 POKE a,b
9030 NEXT a
9040 LET x=0: FOR f=40000 TO 401
46
9050 LET x=x+ PEEK f
9060 NEXT f
9070 IF x <> 10232 THEN  PRINT
INK 2; PAPER 6; BRIGHT 1; FLASH
1; AT 11,9;"ERROR IN DATA": BEEP
 2,-10: STOP
9080 CLS
9090 GO TO 5
9100 DATA 33,0,88,58,0,91,14,24,
6,15,35,94,43,115,35,16,249,119,
35,35,35,35,35,35,35,35,35,35,35
,35,35,35,35,35,35,13,32,226,201

9110 DATA 17,0,88,33,0,0,1,224,2
,237,176,201
9120 DATA 33,255,90,58,0,91,14,2
4,6,15,43,94,35,115,43,16,249,11
9,43,43,43,43,43,43,43,43,43,43,
43,43,43,43,43,43,43,13,32,226,2
01
9130 DATA 33,32,88,17,0,88,1,128
,1,237,176,58,0,91,6,32,18,19,16
,252,201
9150 DATA 33,223,90,17,255,90,1,
96,1,237,184,58,0,91,6,32,18,27,
16,252,201
9160 DATA 6,255,33,0,6,17,10,0,4
3,205,181,3,16,250,201
```

You've got it Licked

Solve Jet Set Willy with: POKE 35899,0 which gives you infinite lives; POKE 36477,1 which allows you to fall without dying; POKE 59900,0 which stops the attic bug, POKE 35123,0 which removes all moving objects and POKE 37874,0 which will automatically collect any object in a room.

Craig Lemon, Braintree, Essex

Finish Jet Set Willy more quickly than you ever dreamed of by adding 38 POKE 37925,0 to the loader program. You will then be able to go straight to bed, for Maria will have gone.

Paul Williams, Tamworth, Staffs

Who put this one here? Come on, own up. Ed.

A **slick way** of disabling the BREAK key on your Spectrum is to enter as your first line: 10 LET W=PEEK 23613-2: POKE 23613,W

The effect of this is sometimes negated by FOR . . . NEXT loops, GOTOs and GOSUBs so it may have to be repeated within your program.

Also: make your program disappear with POKE 23755, 100 and make it reappear with POKE 23755,0.

Russell Haydon, East London

Entering PRINT USR 12345 will cause your Spectrum to freeze. It will only start to work again if you switch it on and off again.

Toby Drysdale, Moss, Doncaster

Much the same effect can be produced by unplugging your computer. A more permanent effect will be achieved if you persuade a large elephant to jump up and down on your machine (this will work on any type or make of computer). Ed.

NOTICE TO ALL WRITERS

Infinite lives, freedom from all difficulties, what is happening? Software Projects wanted their game to be difficult, not a short romp through the loader program. No more **Jet Set Willy** tips will be printed, whether useful, funny or just plain ridiculous.

By order,
THE EDITOR

Achieve infinite lives in your favourite arcade games:

Tranz Am POKE 25446,0

Kosmic Kanga POKE 2394

Jet Set Willy No, no, no. Ed.

Eskimo Eddie POKE 24686,24 and then POKE 24687,76 before line 30

Hunchback POKE 26888,0

Arcadia POKE 25776,0

Andrew Warwick, South Shields

In Jet Set Willy, remove the star on the main landing with: 31 POKE 54814,0 and make Willy walk backwards with: 35 POKE 36477,1

M Jones, Wolverhampton.

Check your spare memory with:
PRINT 65536-USR 7962; " Bytes left"

Set the computer to CAPS LOCK with POKE 23658,8 and return it to normal with POKE 23658,0. Scroll the whole page up to the top line with LET S=USR 3330, which must be followed by CLS. Scroll whole page one line only with LET S=USR 3582.

All these will work on the 48K Spectrum.

Andrew Grant, Budleigh, Devon.

Make your programs RUN automatically by finishing them with:
9997 STOP
9998 SAVE "THE NAME OF YOUR PROGRAM" LINE 1
9999 GOTO 1
and then entering GOTO 9998 when you want to save your program.

Blake Gilchrist, Dulverton, Somerset

ZX-81 owners, help your fingers to find the correct keys whilst playing a game by sticking file paper hole strengtheners onto the appropriate keys.

Michael Chadwick, Heywood, Lancs

When writing a program on your ZX-81 you may need most, if not all, of the memory. If you have 32K, to set a higher ramtop enter:
POKE 16389,192
For the 48K Ram, key in
POKE 16388,255
POKE 16389,255

Paul Slaven, Exeter, Devon

Pen-friends

Rachel Key, 4 High View, Feniton, Devon EX14 0EG is 12 years old and would like to correspond with someone who also owns a 48K Spectrum. She enjoys programming her computer to play games, and her favourite game is **Pac-man.** She is not yet able to study computing at school and so wishes to improve her computing by finding a penfriend.

Carl Murphy, 87 Selwyn Street, Kirkdale, Liverpool L4 3TN is eleven years old and owns a 48K Spectrum. His favourite magazine is *Sinclair Programs* and he too would like to swap games, ideas and programs.

Andrew Hutchinson, 32 Water Royd Avenue, Mirfield, West Yorkshire is 14 years old and owns a 48K Spectrum, joystick and interface. He enjoys arcade adventure games, his favourites being **Atic Atac** and **Pyjamarama.**

Benjamin Gill, 2 Beechwood Close, Crays Pond, Goring Heath, Reading, Berkshire is 12 years old and owns a 48K Spectrum. He likes fast-moving games such as **Decathlon, Harrier** and **Chequered Flag.**

Steen Jacobsen, Torneroseve j 4, 4200 Slagelse, Denmark is 15 years old and owns a ZX-81. He would like to exchange tips, news, advice and programs, and is willing to write in English.

James Hills, 10 The Laurels, Gledhow Lane, Leeds 8 is 10 years old and is looking for a penpal to help him with his computing and swap ideas and program listings.

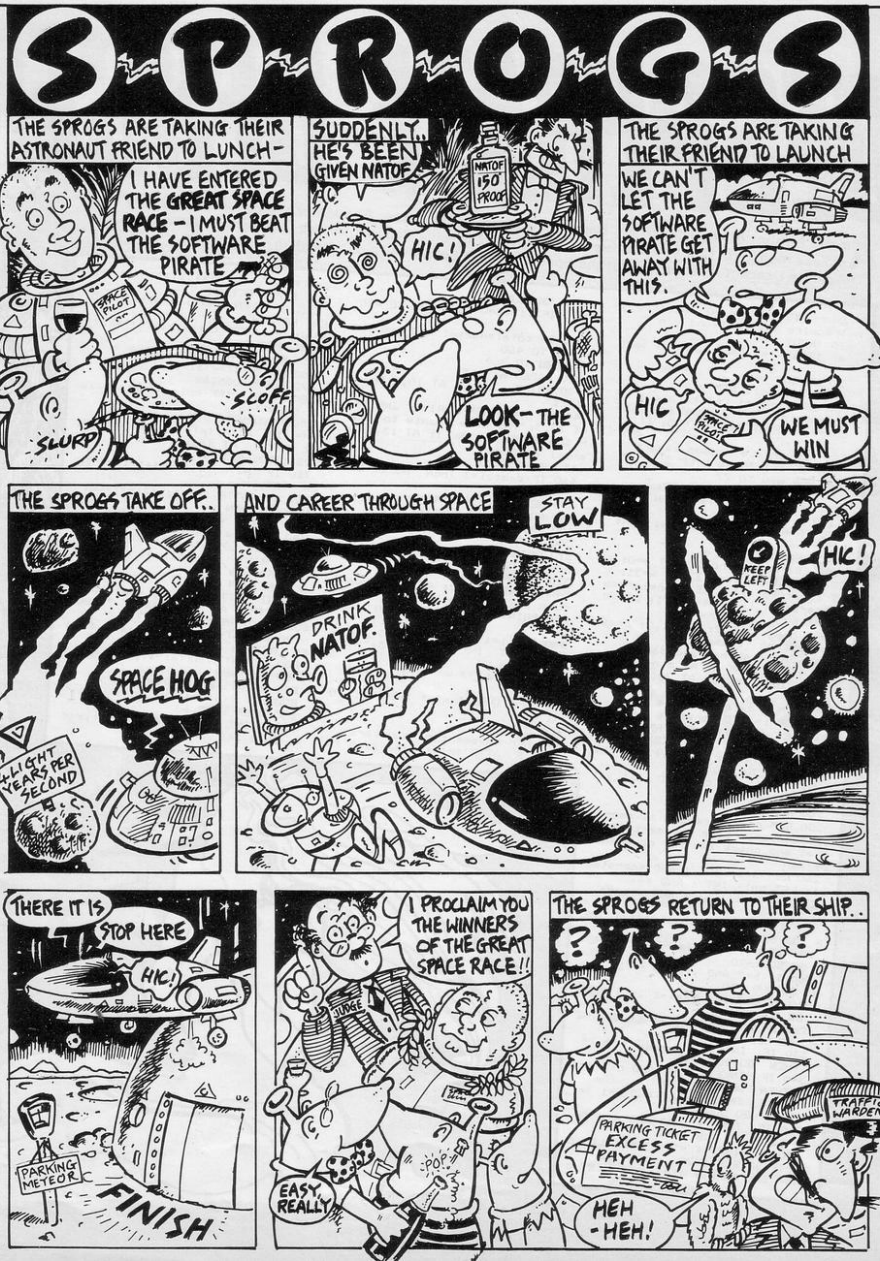
Stephen Davies, 47 Wincanton Road, Southfields, London SW18 5TZ is 13 years old and owns a 48K Spectrum. He buys Sinclair Programs regularly, enjoys programming and games, and now knows a lot about the Spectrum.

3D GRANDPRIX

The winner of the grand prix will win fame and fortune, the loser will finish with a badly dented car and wounded pride. Through your windscreen you can see the cars you are about to overtake. It is essential to avoid crashes if you wish to score enough points to win. To succeed before your time runs out you must take the chance of driving as fast as possible.

3D Grandprix was written for the 16K ZX-81 by Neil I Cottrell of Brentford, Middlesex.

```
   1 PRINT "N.C. PRODUCTION",,"Y
OU ARE THE SEAT OF A FORMULA   O
NE RACING CAR.YOU HAVE A 3D    V
IEW OF THE CARS YOU OVER TAKE. I
F THEY HIT YOU,YOU LOSE TIME,  Y
OU NEED TIME TO WIN BY SCOREINGS
00 BEFORE YOUR TIME UP.THE FASTE
R YOU DRIVE THE MORE YOU SCORE A
ND THE LESS TIME YOU USE."
   2 PRINT "SCORE IS ON TOP OF T
RACK,TIME   IS ON BOTTOM.",,,,"C
OMTROLS...",,"8=RIGHT",,"5=LEFT"
,,"0=DECREASE SPEED","9=INCREASE
 SPEED"
   3 PRINT ,,"PRESS ANY KEY.",,"
HAPPY CRASHING."
   4 IF INKEY$="" THEN GOTO 4
   5 CLS
  10 LET HS=0
  20 LET S=0
  25 LET T=300
  35 LET D=10
  40 CLS
  45 PRINT AT 3,14;S;AT 21,15;T;
AT 4,16;"▪";TAB 15;"▪ ▪";TAB 14;
"▌   ▌";TAB 13;"▌     ▌";TAB 12;
"▌";TAB 20;"▌";TAB 11;"▪▪";TAB 2
0;"▪▪";TAB 11;"▌";TAB 21;"▌";TAB
 10;"▌";TAB 22;"▌";TAB 10;"▌";TA
B 22;"▌";TAB 9;"▌";TAB 23;"▌";TA
B 9;"▌";TAB 23;"▌";TAB 8;"▌";TAB
 24;"▌";TAB 8;"▌";TAB 24;"▌";TAB
 7;"▪▪";TAB 24;"▪▪";TAB 7;"▌";TA
B 25;"▌";TAB 7;"▌";TAB 25;"▌"
  46 IF S>=500 THEN GOTO 3000
  47 IF T<=0 THEN GOTO 1900
  50 PRINT AT 6,16;"▪"
  55 GOSUB 200
  60 LET A=1
  70 LET Z=INT (RND*2)+1
  80 LET X=0
 100 IF Z=1 THEN PRINT AT 8,15;"
▪"
 110 IF Z=2 THEN PRINT AT 8,17;"
▪"
 120 IF INKEY$="5" THEN GOSUB 20
0
 130 IF INKEY$="8" THEN GOSUB 30
0
 150 LET X=X+1
 155 LET Z=Z+(RND>.8 AND Z<2)-(R
ND<.2 AND Z>1)
 156 FOR N=1 TO D
 157 NEXT N
 158 LET D=D+(INKEY$="0" AND D<2
0)-(INKEY$="9" AND D>1)
 159 LET T=T-D/2
 160 IF X=3 THEN GOTO 1200
 170 IF X=2 THEN GOTO 1100
 180 IF X=1 THEN GOTO 1000
 190 IF X=4 THEN GOTO 1300
 195 GOTO 120
 200 LET A=1
 210 PRINT AT 17,12;"▪ ▪ ▪";TAB 1
2;"▛▀▀▀▜";TAB 12;"▪   ▪";AT 17,17;
"   ";TAB 17;"   ";TAB 17;"
"
 220 RETURN
 300 LET A=2
 310 PRINT AT 17,17;"▪ ▪ ▪";TAB 1
7;"▛▀▀▀▜";TAB 17;"▪   ▪";AT 17,12;
"   ";TAB 12;"   ";TAB 12;"
"
 320 RETURN
1000 IF Z=1 THEN PRINT AT 10,14;
"▪▪"
1010 IF Z=2 THEN PRINT AT 10,17;
"▪▪"
1020 GOTO 120
1100 IF Z=1 THEN PRINT AT 12,13;
"▛▀▜"
1110 IF Z=2 THEN PRINT AT 12,17;
"▛▀▜"
1120 GOTO 120
1200 IF Z=1 THEN PRINT AT 14,13;
"▪ ▪";TAB 13;"▛▀▜"
1210 IF Z=2 THEN PRINT AT 14,17;
"▪ ▪";TAB 17;"▛▀▜"
1220 GOTO 120
1300 IF Z=1 THEN PRINT AT 17,12;
"▟▙▟▙";TAB 12;"▛▀▀▜";TAB 12;"▪
▄▄▄▪"
1310 IF Z=2 THEN PRINT AT 17,17;
"▟▙▟▙";TAB 17;"▛▀▀▜";TAB 17;"▪
▄▄▄▪"
1320 IF Z=A THEN GOTO 1400
1330 LET S=S+21-D
1350 LET D=D-(D>1)
1360 GOTO 40
1400 FOR N=1 TO 5
1500 PAUSE 2
1600 NEXT N
1700 LET T=T-10
1800 GOTO 40
1900 PRINT AT 12,13;"GAME";TAB 1
3;"OVER"
2000 IF HS>S THEN GOTO 2200
2010 PRINT AT 21,0;"INPUT NAME"
2100 INPUT E$
2150 LET HS=S
2200 PRINT AT 0,0;"HIGHEST SCORE
=";HS;" BY ";E$
2300 PAUSE 4E4
2500 CLS
2600 GOTO 20
3000 PRINT AT 15,13;"YOU WON"
3050 LET S=S+T
3100 GOTO 2000
9000 SAVE "3D GRANDPRI▪"
9990 RUN
```

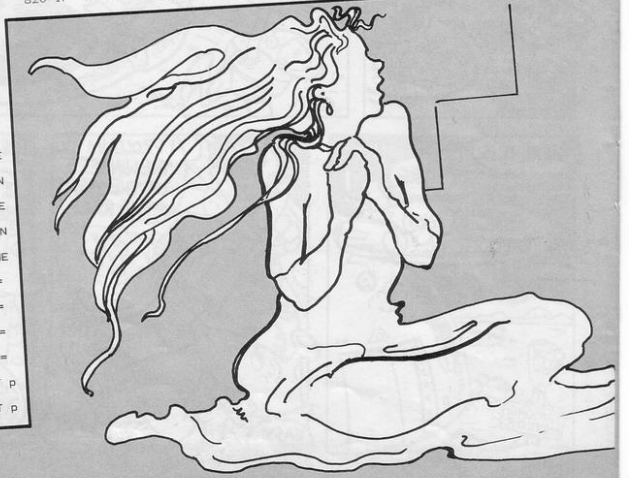

SPROGS
THE SPROGS ARE TAKING THEIR ASTRONAUT FRIEND TO LUNCH-
I HAVE ENTERED THE GREAT SPACE RACE - I MUST BEAT THE SOFTWARE PIRATE
SLURP
SLOFF
SUDDENLY.. HE'S BEEN GIVEN NATOF
NATOF 150 PROOF
HIC!
LOOK- THE SOFTWARE PIRATE
THE SPROGS ARE TAKING THEIR FRIEND TO LAUNCH
WE CAN'T LET THE SOFTWARE PIRATE GET AWAY WITH THIS.
HIC
WE MUST WIN
THE SPROGS TAKE OFF..
SPACE HOG
4 LIGHT YEARS PER SECOND
AND CAREER THROUGH SPACE
STAY LOW
DRINK NATOF.
KEEP LEFT
HIC!
THERE IT IS
STOP HERE
HIC!
PARKING METEOR
FINISH
I PROCLAIM YOU THE WINNERS OF THE GREAT SPACE RACE!!
JUDGE
POP!
EASY, REALLY
THE SPROGS RETURN TO THEIR SHIP..
PARKING TICKET EXCESS PAYMENT
TRAFFIC WARDEN
HEH -HEH!

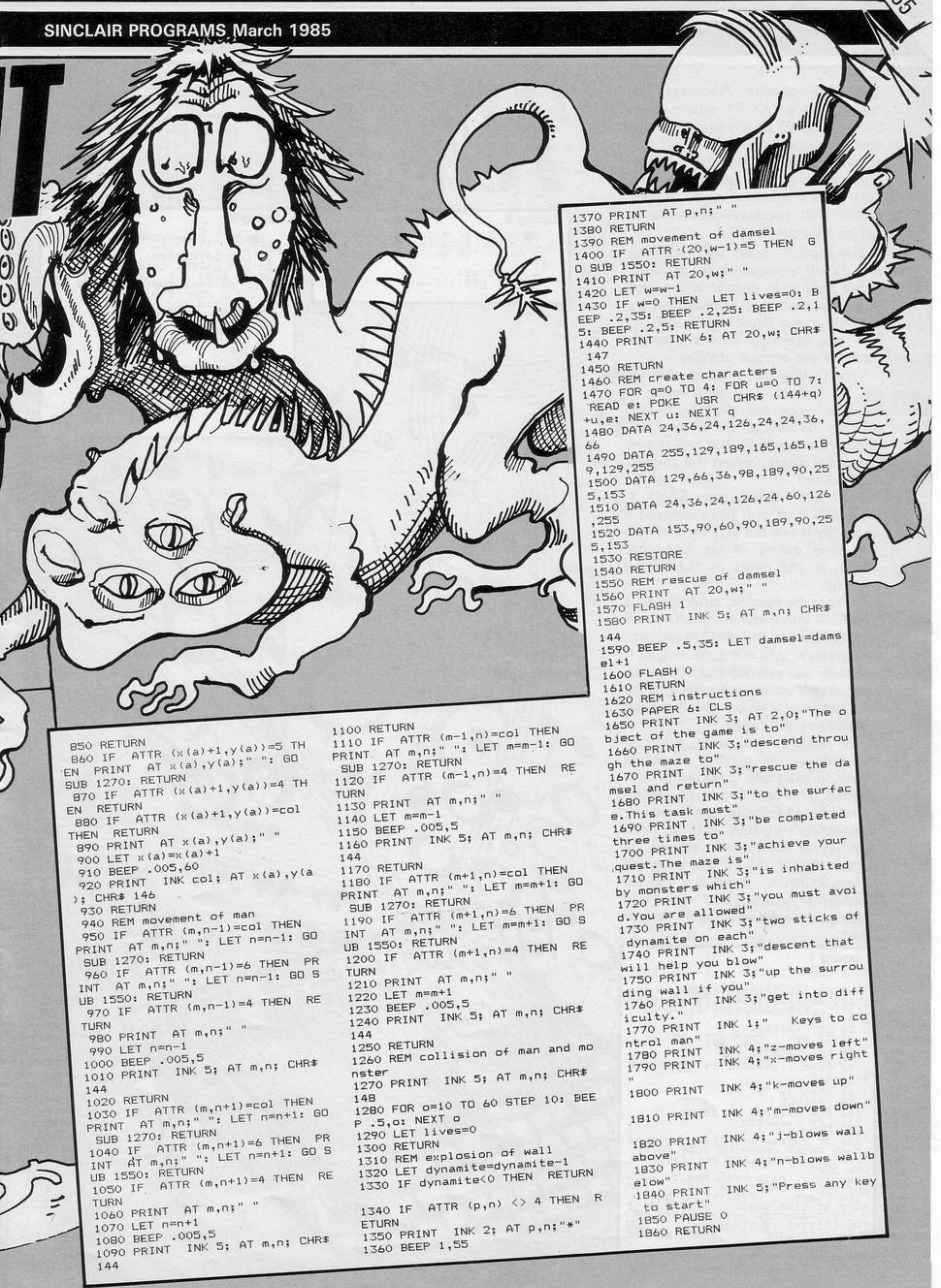
DESPERATE DESCEN

At the bottom of the screen sits Daphnia, trapped in the caves. Above her are caverns swarming with pitiless monsters. Can you venture into the depths to save Daphnia, or will you die in the attempt?

Desperate Descent was written for the Spectrum by D Spinks of Hyde, Cheshire.

```
  20 PRINT  INK 2; AT 10,0;"Do y
ou require instructions y/n?"
  30 INPUT b$
  40 IF b$="y" THEN  GO SUB 1620

  50 GO SUB 1470
  60 DIM x(40): DIM y(40)
  70 LET rand=6: LET total=0: LE
T monsters=10: LET damsel=0: LET
 col=0: BORDER 0: PAPER 0: CLS

  80 REM create random cavern
  90 FOR q=1 TO 20 STEP 2
 100 FOR w=0 TO 27
 110 LET e= INT ( RND *32)
 120 IF  ATTR (q,e)=4 THEN  GO T
O 110
 130 PRINT  INK 4; AT q,e; CHR$
145
 140 NEXT w: NEXT q
 150 LET rand=rand-1: LET m=0: L
ET n=0: LET lives=1: LET w=31: L
ET total=total+1: LET monsters=m
onsters+10: LET col=col+1: LET d
ynamite=2
 160 PRINT  INK 2; AT 21,0;"Dams
els rescued ";damsel
 170 REM print man and damsel
 180 PRINT  INK 5; AT m,n; CHR$
144; PRINT  INK 6; AT 20,w; CHR$
 147
 190 REM create monsters
 200 FOR l=1 TO monsters
 210 LET x(l)=1+ INT ( RND *19):
 LET y(l)= INT ( RND *32)
 220 IF  ATTR (x(l),y(l))=56+col
 THEN  GO TO 210
 230 PRINT  INK col; AT x(l),y(l
); CHR$ 146
 240 NEXT l
 250 REM create random movement
of monster,create movement of da
msel and check key for movement
of man
 260 LET a=1+ INT ( RND *monster
s): LET b=1+ INT  ( RND *4)
 270 LET v=1+ INT ( RND *rand)

 280 IF v=3 AND damsel<total THE
N  GO SUB 1400
 290 IF b=1 AND y(a)-1 >= 0 THEN
  GO SUB 620
 300 IF b=2 AND y(a)+1 <= 31 THE
N  GO SUB 700
 310 IF b=3 AND x(a)-1 >= 1 THEN
  GO SUB 780
 320 IF b=4 AND x(a)+1 <= 19 THE
N  GO SUB 860
 330 IF  INKEY$ ="z" AND n-1 >=
0 THEN  GO SUB 950
 340 IF  INKEY$ ="x" AND n+1 <=
31 THEN  GO SUB 1030
 350 IF  INKEY$ ="k" AND m-1 >=
0 THEN  GO SUB 1110
 360 IF  INKEY$ ="m" AND m+1 <=
20 THEN  GO SUB 1180
 370 IF  INKEY$ ="j" THEN  LET p
=m-1: GO SUB 1320
 380 IF  INKEY$ ="n" THEN  LET p
=m+1: GO SUB 1320
 390 IF lives=0 THEN  GO TO 420

 400 IF total=damsel AND m=0 THE
N  GO TO 460
 410 GO TO 260
 420 PAPER 6: CLS
 430 PRINT  INK 2; AT 10,3;"Hard
 luck"
 440 IF w=0 THEN  PRINT  INK 1;
AT 12,3;"You were unable to reac
h the": PRINT  INK 1; AT 13,3;"d
amsel in time"
 450 GO TO 570
 460 IF damsel=3 THEN  GO TO 530

 470 REM clear monsters
 480 FOR l=1 TO monsters
 490 PRINT  AT x(l),y(l);" "
 500 NEXT l
 510 PRINT  AT m,n;" "
 520 GO TO 150
 530 PAPER 6: CLS
 540 PRINT  INK 2; AT 10,3;"well
 done you saved all three"
 550 PRINT  INK 2; AT 12,3;"dams
els"
 560 FOR l=1 TO 5: BEEP .3,20: B
 570 PRINT  INK 1; AT 15,3;"Anot
her go y/n ?"
 580 IF  INKEY$ ="" THEN  GO TO
580
 590 IF  INKEY$ ="y" THEN  GO TO
 70
 600 STOP
 610 REM movement of monsters
 620 IF  ATTR (x(a),y(a)-1)=5 TH
EN  PRINT  AT x(a),y(a);" ": GO
SUB 1270: RETURN
 630 IF  ATTR (x(a),y(a)-1)=4 TH
EN  RETURN
 640 IF  ATTR (x(a),y(a)-1)=col
THEN  RETURN
 650 PRINT  AT x(a),y(a);" "
 660 LET y(a)=y(a)-1
 670 BEEP .005,60
 680 PRINT  INK col; AT x(a),y(a
); CHR$ 146
 690 RETURN
 700 IF  ATTR (x(a),y(a)+1)=5 TH
EN  PRINT  AT x(a),y(a);" ": GO
SUB 1270: RETURN
 710 IF  ATTR (x(a),y(a)+1)=4 TH
EN  RETURN
 720 IF  ATTR (x(a),y(a)+1)=col
THEN  RETURN
 730 PRINT  AT x(a),y(a);" "
 740 LET y(a)=y(a)+1
 750 BEEP .005,60
 760 PRINT  INK col; AT x(a),y(a
); CHR$ 146
 770 RETURN
 780 IF  ATTR (x(a)-1,y(a))=5 TH
EN  PRINT  AT x(a),y(a);" ": GO
SUB 1270: RETURN
 790 IF  ATTR (x(a)-1,y(a))=4 TH
EN  RETURN
 800 IF  ATTR (x(a)-1,y(a))=col
THEN  RETURN
 810 PRINT  AT x(a),y(a);" "
 820 LET x(a)=x(a)-1
 830 BEEP .005,60
 840 PRINT  INK col; AT x(a),y(a
); CHR$ 146
```





```
850 RETURN
860 IF ATTR (x(a)+1,y(a))=5 TH
EN PRINT AT x(a),y(a);" ": GO
SUB 1270: RETURN
870 IF ATTR (x(a)+1,y(a))=4 TH
EN RETURN
880 IF ATTR (x(a)+1,y(a))=col
THEN RETURN
890 PRINT AT x(a),y(a);" "
900 LET x(a)=x(a)+1
910 BEEP .005,60
920 PRINT INK col; AT x(a),y(a
); CHR$ 146
930 RETURN
940 REM movement of man
950 IF ATTR (m,n-1)=col THEN
PRINT AT m,n;" ": LET n=n-1: GO
SUB 1270: RETURN
960 IF ATTR (m,n-1)=6 THEN PR
INT AT m,n;" ": LET n=n-1: GO S
UB 1550: RETURN
970 IF ATTR (m,n-1)=4 THEN RE
TURN
980 PRINT AT m,n;" "
990 LET n=n-1
1000 BEEP .005,5
1010 PRINT INK 5; AT m,n; CHR$
144
1020 RETURN
1030 IF ATTR (m,n+1)=col THEN
PRINT AT m,n;" ": LET n=n+1: GO
SUB 1270: RETURN
1040 IF ATTR (m,n+1)=6 THEN PR
INT AT m,n;" ": LET n=n+1: GO S
UB 1550: RETURN
1050 IF ATTR (m,n+1)=4 THEN RE
TURN
1060 PRINT AT m,n;" "
1070 LET n=n+1
1080 BEEP .005,5
1090 PRINT INK 5; AT m,n; CHR$
144
1100 RETURN
1110 IF ATTR (m-1,n)=col THEN
PRINT AT m,n;" ": LET m=m-1: GO
SUB 1270: RETURN
1120 IF ATTR (m-1,n)=4 THEN RE
TURN
1130 PRINT AT m,n;" "
1140 LET m=m-1
1150 BEEP .005,5
1160 PRINT INK 5; AT m,n; CHR$
144
1170 RETURN
1180 IF ATTR (m+1,n)=col THEN
PRINT AT m,n;" ": LET m=m+1: GO
SUB 1270: RETURN
1190 IF ATTR (m+1,n)=6 THEN PR
INT AT m,n;" ": LET m=m+1: GO S
UB 1550: RETURN
1200 IF ATTR (m+1,n)=4 THEN RE
TURN
1210 PRINT AT m,n;" "
1220 LET m=m+1
1230 BEEP .005,5
1240 PRINT INK 5; AT m,n; CHR$
144
1250 RETURN
1260 REM collision of man and mo
nster
1270 PRINT INK 5; AT m,n; CHR$
148
1280 FOR o=10 TO 60 STEP 10: BEE
P .5,o: NEXT o
1290 LET lives=0
1300 RETURN
1310 REM explosion of wall
1320 LET dynamite=dynamite-1
1330 IF dynamite<0 THEN RETURN

1340 IF ATTR (p,n) <> 4 THEN R
ETURN
1350 PRINT INK 2; AT p,n;"*"
1360 BEEP 1,55
1370 PRINT AT p,n;" "
1380 RETURN
1390 REM movement of damsel
1400 IF ATTR (20,w-1)=5 THEN G
O SUB 1550: RETURN
1410 PRINT AT 20,w;" "
1420 LET w=w-1
1430 IF w=0 THEN LET lives=0: B
EEP .2,35: BEEP .2,25: BEEP .2,1
5: BEEP .2,5: RETURN
1440 PRINT INK 6; AT 20,w; CHR$
147
1450 RETURN
1460 REM create characters
1470 FOR q=0 TO 4: FOR u=0 TO 7:
READ e: POKE USR CHR$ (144+q)
+u,e: NEXT u: NEXT q
1480 DATA 24,36,24,126,24,24,36,
66
1490 DATA 255,129,189,165,165,18
9,129,255
1500 DATA 129,66,36,98,189,90,25
5,153
1510 DATA 24,36,24,126,24,60,126
,255
1520 DATA 153,90,60,90,189,90,25
5,153
1530 RESTORE
1540 RETURN
1550 REM rescue of damsel
1560 PRINT AT 20,w;" "
1570 FLASH 1
1580 PRINT INK 5; AT m,n; CHR$
144
1590 BEEP .5,35: LET damsel=dams
el+1
1600 FLASH 0
1610 RETURN
1620 REM instructions
1630 PAPER 6: CLS
1650 PRINT INK 3; AT 2,0;"The o
bject of the game is to"
1660 PRINT INK 3;"descend throu
gh the maze to"
1670 PRINT INK 3;"rescue the da
msel and return"
1680 PRINT INK 3;"to the surfac
e.This task must"
1690 PRINT INK 3;"be completed
three times to"
1700 PRINT INK 3;"achieve your
quest.The maze is"
1710 PRINT INK 3;"is inhabited
by monsters which"
1720 PRINT INK 3;"you must avoi
d.You are allowed"
1730 PRINT INK 3;"two sticks of
dynamite on each"
1740 PRINT INK 3;"descent that
will help you blow"
1750 PRINT INK 3;"up the surrou
nding wall if you"
1760 PRINT INK 3;"get into diff
iculty."
1770 PRINT INK 1;" Keys to co
ntrol man"
1780 PRINT INK 4;"z-moves left"
1790 PRINT INK 4;"x-moves right
"
1800 PRINT INK 4;"k-moves up"
1810 PRINT INK 4;"m-moves down"
1820 PRINT INK 4;"j-blows wall
above"
1830 PRINT INK 4;"n-blows wallb
elow"
1840 PRINT INK 5;"Press any key
to start"
1850 PAUSE 0
1860 RETURN
```

TUNES...

So far, *Sinclair Programs'* attempts at ZX-81 sound have been confined to a variety of raucous squeaks and off-key squawks. Paddy Moindrot of Oswestry, Shropshire puts an end to that with a machine code routine which will produce recognisable Tunes on your ZX-81.

The routine works by modifying the SAVE command to produce tunes read from data in a line two REM statement. It is operated by the command RAND USR 16514, and will produce sound through your TV set or tape monitor.

When using this routine, turn up the TV sound. You may have to readjust your set slightly. While making the sounds the screen will display saving lines, but will return to normal display when the sounds are finished.

First enter listing one, SAVE it, and RUN it. If you have entered it correctly it will tell you so, and you can then delete all but line one, which is the heart of the sound routine.

To test the routine, enter listing 2 and RUN it in FAST mode. You can change the line two REM statement to whatever you want, as long as it contains an even number of characters. At present it contains a name and address, which produce an "arcade-style" noise.

For more serious uses, such as the storing and playing of actual tunes, a program to enter data is needed. This is listing three, which should be added after the basic line one. A line two REM with an even number of characters should be added. Again, SAVE the program before RUNning. It will ask you for duration (1 to 255) and note (1 to 155) and ends when line two is filled.

Listing 1

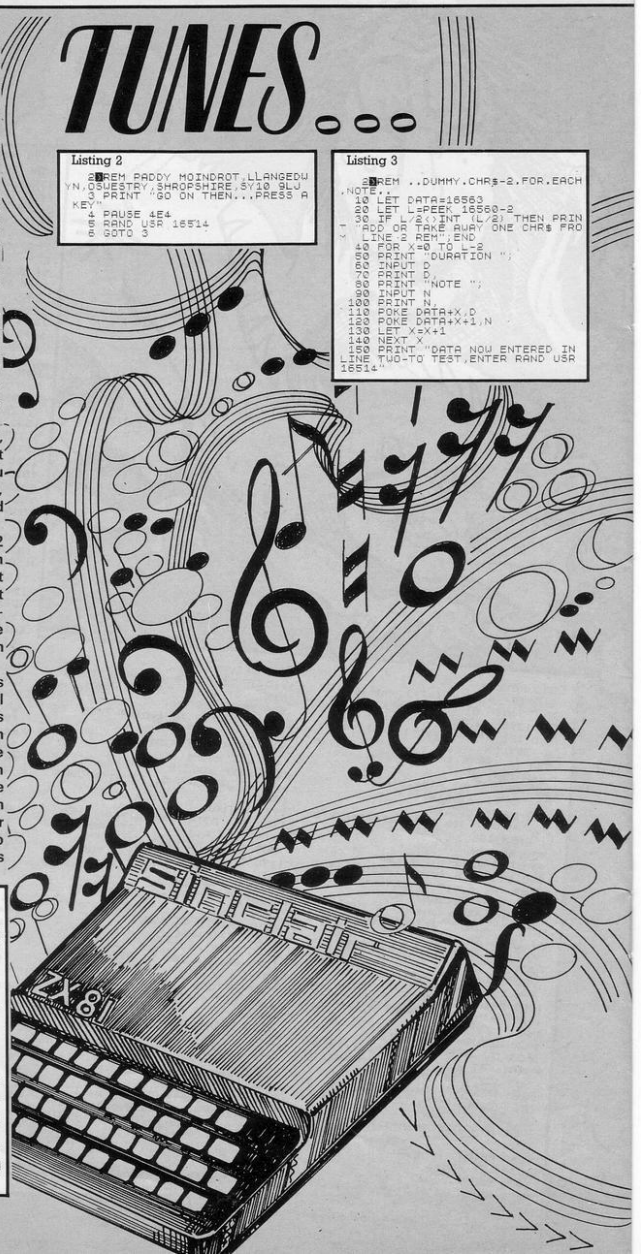
```
  1 REM ...,43,DUMMY,CHARACTER$,
'',',',',',',',',',',',',',',',
 10 LET A$="1E3A0A402E235E56CDB80
2D21E11809235E56CDB07BFE7ECB38057BFE0
02028F21BFFF7E3D20FDC9FF7E3D20FD1D1
D0C9"
 20 LET X=16514
 30 IF A$= "" THEN GOTO 90
 40 LET B$=A$( TO 2)
 50 LET A$=A$(3 TO )
 60 POKE X,16+CODE B$(1)+CODE B
$(2)-476
 70 LET X=X+1
 80 GOTO 30
 90 LET Y=0
100 FOR X=16514 TO 16556
110 LET Y=Y+PEEK X
120 NEXT X
130 IF Y<>5410 AND PEEK 16511=45
 THEN PRINT "MACHINE CODE ENTRY
CORRECT-NOW  DELETE ALL EXCEPT L
INE ONE"
140 IF Y<>5410 THEN PRINT "MACH
INE CODE WRONG-CHECK LISTING";ST
150 PRINT "   EDIT LINE ONE -
MAKE IT LINE 999IT CONTRAINS A NE
W LINE CHARACTER WHICH MESSES UP
THE LISTING -BUTREMEMBER YOU MUS
T MAKE IT LINE  ONE AGAIN BEFORE
 "RUNNING"."
```

Listing 2

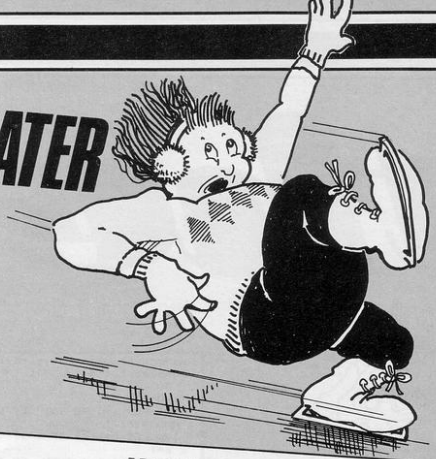
```
  2 REM PADDY MOINDROT,LLANGEDU
YN,OSWESTRY,SHROPSHIRE,SY10 9LW
  3 PRINT "GO ON THEN...PRESS A
KEY"
  4 PAUSE 4E4
  5 RAND USR 16514
  6 GOTO 3
```

Listing 3

```
  2 REM ..DUMMY.CHR$-2.FOR.EACH
.NOTE.
 10 LET DATA=16563
 20 LET L=PEEK 16560-2
 30 IF L/2<>INT (L/2) THEN PRIN
 "ADD OR TAKE AWAY ONE CHR$ FRO
M  LINE 2 REM":END
 40 FOR Y=0 TO L-2
 50 PRINT "DURATION ";
 60 INPUT D
 70 PRINT D
 80 PRINT "NOTE ";
 90 INPUT N
100 PRINT N
110 POKE DATA+X,D
120 POKE DATA+X+1,N
130 LET X=X+1
140 NEXT X
150 PRINT "DATA NOW ENTERED IN
LINE TWO-TO TEST,ENTER RAND USR
16514"
```



INDY THE SKATER



Round and round the pond goes Indy the Skater, moving faster and faster. Then, just as this game begins, the temperature drops and much of the ice on the pond becomes lethal black ice. Control Indy with keys five and eight to keep her circling the pond and save her from hitting the black ice.

Written for the 16K ZX-81 by Wayne Pope and Michael Walters of Faversham, Kent.

```
   5 REM INDY
   6 LET S=0
   7 GOTO 1000
  10 LET A=520
  15 LET B=-1
  20 LET P=PEEK 16396+PEEK 16397
*256+1
  30 PRINT "
 
 
 
```

the Pu

```
  10 REM Puzzler by Chris Hall

  20 REM 48K ZX Spectrum
  25 REM For SINCLAIR PROGRAMS

  30 PAPER 6: BORDER 6: INK 2: C
LS
  31 CLEAR 63999
  32 LET hi=0
  33 LET n$="ZX SPECCY"
  34 POKE 23609,7
  35 GO SUB 9e3
  40 PRINT  AT 1,8; INVERSE 1;"S
inclair Programs"; AT 1,6; INVER
SE 0; INK 3;"CD"; AT 1,25; INK 3
;"D"
  45 PRINT  AT 3,12;"present"
  50 RANDOMIZE  USR 60059
  53 PRINT  AT 6,4;
  55 RESTORE 60: READ a$: FOR f=
1 TO  LEN a$: PRINT a$(f);: BEEP
 .004,f*2
  56 NEXT f
  60 DATA "The Puzzler by Chris
Hall"
  65 PRINT #0;"  Press any key
to continue  "
  66 PAUSE 0: BEEP .1,10: BEEP .
1,13: CLS
  69 BORDER 6
  70 LET z$="vgtniexfbriopelusta
cesrlezavndpecadmntdkouenosdwora
```

```
mshugeyklmbqjoahefyeitbylialwiug
rnhpseeitacoai"
  80 LET y$=""
  90 DIM s(16)
 100 FOR i=1 TO 16: LET k= INT (
RND *16)+1
 120 LET k=k+1: IF k=17 THEN  LE
T k=1
 130 IF s(k)=1 THEN  GO TO 120

 140 LET y$=y$+z$(6*(k-1)+ INT (
RND *6)+1)
 150 LET s(k)=1
 160 NEXT i
 230 PRINT  AT 18,0; INVERSE 1;
INK 3; BRIGHT 1;" Do you want in
structions?(y/n) "
 240 IF  INKEY$ ="n" OR  INKEY$
="N" THEN  BEEP .1,10: BEEP .1,1
3: CLS : BORDER 6: GO TO 1e3
 250 IF  INKEY$ ="y" OR  INKEY$
="Y" THEN  CLS : BEEP .1,10: BEE
P .1,13: BORDER 7: GO TO 2e3
 260 GO TO 240
 300 INK 2: PAPER 6: BORDER 6: C
LS : FOR f=1 TO 3: FOR i=1 TO 7:
 PRINT  AT 2,10; INK i;"The Puzz
ler": NEXT i: NEXT f: PRINT  AT
2,11; INK 2;"The Puzzler"
 305 INK 0: PLOT 80,127: DRAW 10
,10: DRAW 88,0: DRAW -10,-10: DR
AW 10,10: DRAW 0,-87: DRAW -10,-
10
 400 INVERSE 1: INK 1: PAPER 7

 410 PRINT  AT 6,10;"
"
 420 FOR i=7 TO 16
 430 PRINT  AT i,10;" "; AT i,20
;" "
 440 NEXT i
 450 PRINT  AT 16,10;"
"
 460 INVERSE 0
 500 LET m=93: LET n=54
 510 FOR i=m TO m+48 STEP 16
 520 FOR j=n TO n+48 STEP 16
 530 LET y=j: LET x=i
 540 PLOT x,y: DRAW 0,12: BEEP .
0016,50
 550 LET y=y-1: LET x=x+1
 560 FOR k=1 TO 12: PLOT x,y: DR
AW 0,14: LET x=x+1: NEXT k
 590 LET y=y+1
 600 PLOT x,y: DRAW 0,12
 610 NEXT j
 620 NEXT i
 625 LET l= USR bleep
 630 RETURN
 700 REM letter selection
 701 LET w$=y$
 740 RANDOMIZE : FOR i=12 TO 18
STEP 2: FOR j=8 TO 14 STEP 2: PR
INT  AT j,i;w$( INT ( RND *16)+1
): NEXT j: NEXT i
 770 RETURN
1000 PRINT  AT 18,0;"
                     ": GO SUB 3
e2
1010 GO SUB 7e2
1020 POKE 23672,0
```

```
1030 POKE 23673,0
1040 LET min=0: LET sec=0
1050 LET tim=0
1060 IF tim+50>( PEEK 23672+256*
 PEEK 23673) THEN  GO TO 1060
1070 LET sec=sec+1: IF sec=60 TH
EN  LET sec=0: LET min=min+1
1080 LET tim=tim+50
1090 LET s$="Time = "+ STR$ min+
":"
1100 IF sec<10 THEN  LET s$=s$+"
0"
1110 LET s$=s$+ STR$ sec: BEEP .
001,55
1120 PRINT  AT 20,1;s$
1140 IF min<3 THEN  GO TO 1060
1150 PRINT  AT 20,18; FLASH 1; I
NK 2; BRIGHT 1;"Time Up!"; FLASH
 0: FOR f=1 TO 3: RANDOMIZE  USR
 60035: RANDOMIZE  USR 60083: NE
XT f
1151 RANDOMIZE  USR 60059
1155 LET l= USR bleep
1160 PAUSE 2e2
1190 PRINT  AT 8,1;"Letters"; AT
 6,24;"Points"
1200 PRINT  AT 8,1;"3 or 4"; AT
8,26;"1"; AT 10,3;"5"; AT 10,26;
"2"; AT 12,3;"6"; AT 12,26;"3";
AT 14,3;"7"; AT 14,26;"5"; AT 16
,0;"8 or more"; AT 16,26;"10"
1240 FOR l=1 TO 3
```

uzzler

```
1250 RESTORE 1260: FOR f=1 TO 8:
 READ t,n: BEEP t,n: NEXT f: PAU
SE 40:
1260 DATA .1,11,.1,11,.8,16,.05,
11,.05,16,.05,11,.05,16,1,20
1270 NEXT l
1271 POKE 23617,236: INPUT "What
 was the top score ";thi
1272 IF thi>hi THEN  LET hi=thi:
 GO TO 1278
1273 IF thi<hi THEN  GO TO 1279

1274 IF thi=hi THEN  GO TO 1279

1278 POKE 23617,236: INPUT "By w
hom ";n$: IF  LEN n$>20 THEN  GO
 TO 1278
1279 BORDER 6: PAPER 6: INK 3: C
LS : PRINT  AT 0,0; INVERSE 1; B
RIGHT 1;"Today's highest score i
s ";hi''' INVERSE 1; BRIGHT 1;"b
y"; FLASH 0; BRIGHT 0;" "; FLASH
 1; BRIGHT 1;n$; FLASH 0; BRIGHT
 0;" "; RANDOMIZE  USR bleep: PA
USE 0
1280 FOR f=1 TO 6: RANDOMIZE  US
R 60083: NEXT f: FOR f=1 TO 5: R
ANDOMIZE  USR 60035: NEXT f: RAN
DOMIZE  USR 60059: RANDOMIZE  US
R 60059
1289 BORDER 5: PAPER 5: INK 1: C
LS
1290 PRINT "Press a key to run t
he program  again": PAUSE 0: BEE
P .1,10: BEEP .1,13
1999 BORDER 6: PAPER 6: CLS : GO
 TO 69
2000 BORDER 5: PAPER 5: INK 1: C
LS
2001 PRINT  AT 2,0;
2010 RESTORE 2020: READ a$: FOR
f=1 TO  LEN a$: PRINT a$(f);: BE
EP .0009,30: BEEP .0008,40
2011 IF f/32= INT (f/32) THEN  F
OR e=1 TO 4: BEEP .01,30: NEXT e

2012 NEXT f
2020 DATA "THE PUZZLER is a game
 for 2 to  6 players of any age.
The object is to list as many wo
rds as  possible within three
 minutes...Each player should ha
ve a pen  and paper to note his
 or her  words,and there shoul
d be no  peeping at another pl
ayer's  words!!!The 3 minutes
 starts as soon as the clock at
the foot ofthe screen starts.Wor
ds are got by the use of adjoini
ng letters.They may be joined an
y way  including diagonally!
"
2021 PRINT ''"PRESS ANY KEY..."

2022 BEEP .002, INT ( RND *50)

2023 IF  INKEY$ ="" THEN  GO TO
2022
2024 BEEP .1,10: BEEP .1,13: CLS
2025 BORDER 7
2190 LET w$=y$: LET y$="achionea
klmstsal"
2230 GO SUB 3e2: GO SUB 7e2
2231 PRINT  AT 19,0; INVERSE 1;
INK 3; BRIGHT 1;"This is what a
typical screen  looks like..."

2240 PRINT "PRESS ANY KEY...": P
AUSE 0
2241 BEEP .1,10: BEEP .1,13: CLS

2420 PRINT "Proper names,abbrevi
ations and  hyphonised words are
n't allowed.Check that all words
 are spelt  cureklty!If two or m
ore players have the same word,t
his should  be crossed off their
 list.The  score should be calc
ulated from the remaining words."
2540 PRINT  AT 12,2;"Press a key
 to start a game...": PAUSE 0: B
EEP .1,10: BEEP .1,13
2560 LET y$=w$: CLS : GO TO 1e3

8999 STOP
9000 CLS
9001 REM mc+udgs
9005 RESTORE 9010: FOR f=60000 T
O 60106: READ mc: POKE f,mc: NEX
T f
9010 DATA 1,10,7,33,255,0,17,10,
0,29,213,197,205,181,3,193,209,2
25,125,145,111,16,242,251,201
9011 DATA 33,100,1,17,1,0,205,18
1,3,201
9012 DATA 1,30,3,33,255,0,17,100
,0,229,213,197,205,181,3,193,209
,225,125,145,111,16,242,201
9013 DATA 1,10,100,33,255,0,17,7
0,0,229,213,197,205,181,3,193,20
9,225,125,145,111,16,242,201
9014 DATA 1,10,75,33,255,11,17,1
,0,229,213,197,205,181,3,193,209
,225,125,12,111,16,242,201
9019 RESTORE 9050
9020 FOR f= USR "C" TO  USR "D"+
7
9030 READ usr: POKE f,usr: NEXT
f
9070 DATA 24,56,127,255,127,56,2
4,0,0,0,255,255,255,0,0,0
9100 RESTORE 9200: FOR f=42340 T
O 42360: READ mc: POKE f,mc: NEX
T f
9200 DATA 33,24,1,17,10,0,6,255,
229,213,197,205,181,3,193,209,22
5,43,16,244,201
9210 LET bleep=42340
9220 LET fadecls=32000
9230 RESTORE 9240: FOR f=32000 T
O 32037: READ data: POKE f,data:
 NEXT f
9240 DATA 243,6,25,197,33,0,64,2
2,0,62,236,6,25,35,94,245,123,21
1,254,241,43,115,35,16,244,114,3
5,61,32,237,193,16,226,205,107,1
3,251,201
9997 RETURN
9998 STOP
9999 SAVE "Puzzler48K" LINE 1
```

The Puzzler, written for the 48K Spectrum by Chris Hall of Belfast, Northern Ireland, is an extremely well-presented Basic program including some machine-code routines.

A square of 16 letters is displayed on screen. Combine adjoining letters to form as many words as possible, while three minutes tick by on the on-screen clock. Play by yourself, or with friends. Top score in the *Sinclair Programs* office was a paltry five!

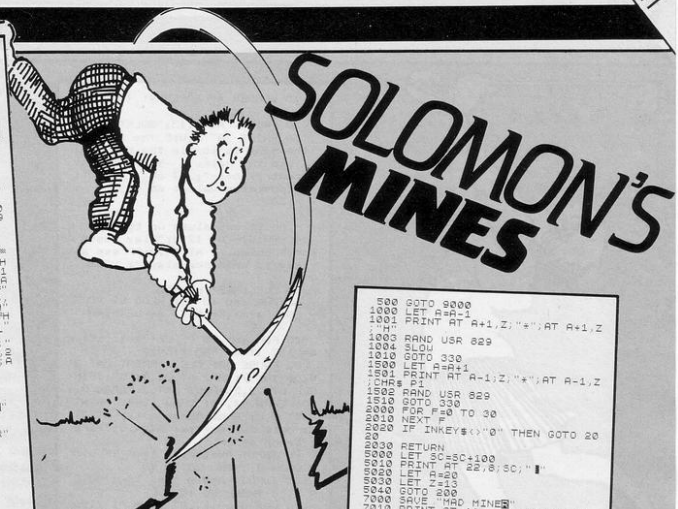
HELLS CAVERNS


```
  0 REM "VOYAGER"
 10 PRINT AT 10,9;"INSTRUCTIONS
                    (Y/N)
 "
 20 IF INKEY$<>"Y" AND INKEY$<>
"N" THEN GOTO 20
 30 IF INKEY$="Y" THEN GOSUB 90
00
  40 LET HI=0
  50 CLS
  60 RANDO INT (RND*8000)
  80 POKE 16418,0
  85 POKE 16418,2
  88 PRINT AT 20,0;"          **
                    ** RST
VOYAGER **
CRYPTO CELLS **
  90 CLS
 100 LET S=0
 110 LET A=15
 120 LET PHASE=1
 130 FOR F=0 TO INT (RND*100)+(5
0*(PHASE=1))
 140 LET Z=INT (RND*31)
 150 PRINT AT 20,Z;"  ";AT 21,Z;"
  "
 160 PRINT AT 0,A-1;"   ";AT 1,A
-2;"     "
 170 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
 180 PRINT AT 1,A;"U"
 190 IF P=128 OR P=130 OR P=7 OR
P=8 THEN GOTO 8000
 200 SCROLL
 210 LET A=A+(INKEY$="5" AND A(3
0)-(INKEY$="8" AND A>1)
 220 LET S=S+INT (RND*2)+1
 230 NEXT F
 240 POKE 16418,0
 250 POKE 16418,RND*87)
 260 LET Z=INT (RND*3)
 270 PRINT "          ** THE
HELL CAVERNS **"
 280 PRINT AT 21,0;"
 290 FOR F=0 TO INT (RND*100)+(5
0*(PHASE=1))
 300 PRINT AT 21,0;"  ";AT 21,Z;"
  "
 205 LET O=INT (RND*2)+1
 210 PRINT AT 0,A-1;"   ";AT 1,A
-2;"     "
 215 LET Z=Z+(O=1 AND Z(27)-(O=2
AND Z>1)
 220 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
 230 PRINT AT 1,A;"U"
 240 IF P=128 OR P=129 OR P=130
OR P=7 OR P=8 THEN GOTO 8000
 250 SCROLL
 260 LET A=A+(INKEY$="8" AND A<3
0)-(INKEY$="5" AND A>1)
 270 LET S=S+INT (RND*2)+1
 280 NEXT F
 290 POKE 16418,0
 300 PRINT AT 23,0;"          ** THE
MOTHERSHIP **"
 320 POKE 16418,2
 325 FOR F=0 TO 20
 330 PRINT AT 0,A-1;"   ";AT 1,A
-2;"     "
 340 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
 350 PRINT AT 1,A;"U"
 360 IF P=128 OR P=129 OR P=130
OR P=7 OR P=8 THEN GOTO 8000
 365 PRINT AT 21,0;"
 370 SCROLL
 380 LET A=A+(INKEY$="8" AND A<3
0)-(INKEY$="5" AND A>1)
 390 LET S=S+INT (RND*2)+1
 400 NEXT F
 410 DIM A$(6,32)
 420 LET A$(1)="
 430 LET A$(2)="
 440 LET A$(3)="
 450 LET A$(4)="
 460 LET A$(5)="
 470 LET A$(6)="
 480 FOR F=1 TO 6
 490 SCROLL
 500 PRINT AT 21,0,A$(F)
 510 PRINT AT 0,A-1;"   ";AT 1,A
-2;"     "
 520 NEXT F
 530 FOR F=1 TO 20
 540 PRINT AT F+1,A-2;"       "
 550 LET P=PEEK (PEEK 16398+256*
PEEK 16399)
 560 PRINT AT F-1,A-2;"       ";AT
 F,A-2;"   ";AT F,A+5;"   "
 570 IF P=CODE "   " OR P=CODE "
   " THEN GOTO 8000
 580 IF F>14 AND A=15 THEN GOTO
 8000
 590 LET A=A+(INKEY$="8" AND A<2
0)-(INKEY$="5" AND A>2)
 600 NEXT F
 610 PRINT AT 16,14;"U";AT 17,15
;"U";AT 18,15;"   ";AT 17,15
 620 PRINT AT 19,15;"   "
 630 FOR F=0 TO 10
 640 PRINT AT 19,0;"          0 1 0 1 0
 "
 650 PRINT AT 19,0;"
 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0
 "
 660 NEXT F
 670 FOR N=0 TO 5
 680 PRINT AT 19,0;"
 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0
 "
 690 NEXT N
 700 PRINT AT 19,0;A$(4)
 710 FOR N=0 TO 5
 720 NEXT N
 730 NEXT F
 740 FAST
 750 FOR F=0 TO 100
 760 NEXT F
 770 SLOW
 780 LET PHASE=PHASE+1
 790 GOTO 90
 8000 FOR F=1 A-1;"   ";AT F
 8005 PRINT AT F+1,A-1;"   ";AT F
+1,A-2;"     "
 8010 FOR F=1 TO 20
 8020 PRINT AT F,0;"          ";AT F,31;"
 "
 8030 NEXT F
 8040 PRINT AT 21,0;"
 7000 PRINT AT 1,1;"
 7010 CLOSE
 7020 PRINT AT 5,1;"YOU SCORED:";
HI
 7030 IF S>HI THEN LET HI=S
 7040 PRINT AT 10,1;"THE HIGH SCO
RE IS:";HI
 7050 IF INKEY$="" THEN GOTO 7050
 7060 GOTO 50
 9000 PRINT AT 0,A-1;"   ";AT 1,A
-2;"     "
 9010 FOR F=1 TO 20
 9020 FOR F=1 TO 20
 9030 PRINT AT F,0;"          ";AT F,31;"
 "
 9040 NEXT F
 9050 PRINT AT 21,0;"
 9060 IF LUCK<>YOU CRASHED" AT 1,1;"HA
RD LUCK"
 9065 IF LUCK="" THEN LET MISS=
 9070 PRINT AT 1,1;"AND GOT";YOU SCORED:";
S;"
 9080 PRINT AT 10,1;"THE HIGH SCORE IS:
";HI
 9090 GOTO 7090
 9100 PRINT AT 0,10;"VOYAGER"
 9110 PRINT AT 3,0;"
 CAPTAIN OF THE      YOU ARE TH
E
 YOU HAVE TO DODGE      SPACE POD      AN
D
 ALL CAVERNS THROUGH THE ASTE
ROIDS. MANOUVRE      THEN DOCK WITH THE
 MOTHERSHIP AND      REFUEL.
 9200 PRINT "USE KEYS:-
 "
 9210 PRINT AT 21,0;"          (-5 8-)
 "
 9240 TO PLAY"      PRESS ANY
 9250 PRINT "KEY"
 9260 IF INKEY$="" THEN GOTO 9260
 9270 CLS
 9280 SAVE "VOYAGER"
 9290 RUN
```

Returning from a scouting trip carrying valuable mineral samples you must return safely to your mother ship. Dodge the chunky asteroids, then negotiate the tortuous paths of Hell's Caverns before you can attempt to dock with the mothership. Use key 5 to move left, and key 8 to move right.

Written for the 16K ZX-81 by Stuart Green of York.

SOLOMON'S MINES



```
 0 REM "MAD MINER"
 5 LET HI=0
10 POKE 16418,0
15 S
20 PRINT AT 0,0;
                TIME:
                   AT 21,0;
CORE  0          MAD MINER
30 FOR F=3 TO 20
40 PRINT AT F,0;
50 NEXT F
60 PRINT AT 4,5;"H";AT 5,6;"
H";AT 6,7;"H";AT 7,8;"H";AT 8,9
;"H";AT 9,8;"H";AT 10,7;"H";AT
 11,6;"H";AT 12,5;"H"
70 PRINT AT 12,8;"H";AT 13,5;"
H";AT 13,11;"H";AT 13,28;"H";AT
 13,15;"H";AT 13,22;"H";AT 14,2
8;"H";AT 15,9;"H";AT 15,16;"H";
AT 15,20;"H";AT 16,5;"H";AT 16,
28;"H";AT 17,4;"H";AT 17,28;"H"
80 PRINT AT 17,4;"H";AT 18,9;"
H";AT 18,15;"H";AT 18,22;"H";AT
 19,2;"H";AT 19,28;"H";AT 19,22
;"H";AT 19,15;"H";AT 20,9;"H";A
T 20,28;"H"
85 FOR N=0 TO 3
90 FOR F=0 TO 40
100 NEXT F
110 PRINT AT 22,20;"MAD MINER"
120 FOR F=0 TO 40
130 NEXT F
140 PRINT AT 22,20;"MAD MINER"
150 NEXT N
160 LET SC=0
170 LET A=20
180 LET Z=13
190 LET T$="
200 LET T=LEN T$
201 PAPER
210 FOR F=1 TO 6
220 LET S=INT (RND*18)+2
230 LET C=INT (RND*30)+1
240 PRINT AT S,C;
250 IF PEEK (PEEK 16398+256+PEE
K 16399)=CODE "H" THEN GOTO 220
260 PRINT AT S-1,X;
270 IF PEEK (PEEK 16398+256+PEE
K 16399)=CODE " " THEN GOTO 220
280 PRINT AT S-1,X;"£"
290 NEXT F
300 LET F=0
301 SLOW
310 FOR F=1 TO LEN T$ STEP T;"
320 PRINT AT 1,6;T$(1 TO T);"
330 PRINT AT A,Z;
340 LET P1=PEEK (PEEK 16398+256
+PEEK 16399)
350 PRINT AT A+1,Z;
360 LET P2=PEEK (PEEK 16398+256
+PEEK 16399)
365 IF P1=CODE "£" THEN LET P=P
+1
366 IF P/6 THEN GOTO 5000
370 IF INKEY$="6" AND P2=CODE "
H" THEN GOTO 1500
380 IF INKEY$="5" AND P1=CODE "
H" THEN GOTO 1000
390 IF INKEY$="7" AND P2<>COD
E " " AND P2<>CODE "H" THEN GOTO
 8000
391 PRINT AT A,Z;"
392 PRINT AT A-1,Z;"
393 IF P1=CODE "H" THEN PRINT A
T A,Z;"H"
400 IF INKEY$<>"5" AND INKEY$<>
"6" AND INKEY$<>"0" THEN GOTO 43
0
401 IF INKEY$="0" THEN GOSUB 20
00
410 PRINT AT A,Z;" "
415 IF P1=CODE "H" THEN PRINT A
T A,Z;"H"
420 LET Z=Z+(INKEY$="8")-(INKEY
$="5")
425 RAND USR 829
430 NEXT T
```

Digging in your back garden one day, you fell through into a disused mineworking. To your surprise, you found bags of gold scattered around the levels. Using the cursor keys 5 to 8, move around the levels to collect the gold. You must collect sufficient gold to allow you to move onto the next screen before the air on one screen runs out. If you fall from a level you will die, and the game will end.

Solomon's Mines was written for the 16K ZX-81 by Stuart Green of York.

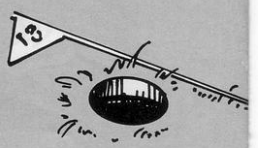
```
 500 GOTO 9000
1000 LET A=A-1
1001 PRINT AT A+1,Z;"*";AT A+1,Z
     "H"
1003 RAND USR 829
1004 SLOW
1010 GOTO 330
1500 LET A=A+1
1501 PRINT AT A-1,Z;"*";AT A-1,Z
     CHR$ 9
1505 RAND USR 829
1510 GOTO 330
2000 FOR F=0 TO 30
2010 NEXT F
2020 IF INKEY$<>"0" THEN GOTO 20
     0
5030 RETURN
5040 LET SC=SC+100
5050 PRINT AT 22,8;SC;"
5060 LET A=20
5070 LET Z=13
5540 GOTO 200
7000 SAVE "MAD MINER"
7010 PRINT AT 11,10;"MAD MINER"
7020 FOR F=0 TO 100
7030 NEXT F
7040 RUN
8000 FOR F=A TO 23
8010 PRINT AT F,Z;"
8020 LET P=PEEK (PEEK 16398+256+
PEEK 16399)
8030 IF P=CODE "
  OR P=CODE "H"
N GOTO 8100
8040 PRINT AT F,Z;"*"
8041 PRINT AT F,Z;"
8045 NEXT F
8100 LET F=F-1
8101 FOR N=0 TO 5
8110 PRINT AT F,Z;"
/";AT F,Z;"|";AT F,Z;"\";AT F,Z;"+
"
8120 NEXT N
8130 GOTO 9500
9000 FOR F=0 TO 9
9010 PRINT AT F,1;T$
9030 FOR N=0 TO 40
9031 NEXT N
9040 PRINT AT 1,0;"TIME
9050 FOR N=0 TO 40
9060 NEXT N
9070 NEXT F
9500 PRINT AT 10,9;"
;AT 11,9;" GAME OVER ";AT 12,9;"
9510 FOR F=0 TO 100
9520 NEXT F
9530 PRINT AT 22,0;"
9535 POKE 16418,2
9540 FOR F=0 TO 6
9550 SCROLL
9560 PRINT AT 21,10;"GAME OVER"
9570 NEXT F
9580 FOR F=0 TO 20
9590 SCROLL
9600 NEXT F
9610 PRINT AT 3,0;"SCORE:";SC
9620 IF SC>HI THEN LET HI=SC
9630 PRINT AT 5,0;"HI-SCORE:";HI
9640 PRINT AT 19,0,"PRESS:  (1)T
O RE-RUN                    (2)T
O QUIT ""                   (3)L
OAD ""
9650 IF INKEY$<>"1" AND INKEY$<>
"2" AND INKEY$<>"3" THEN GOTO 96
50
9660 LET A$=INKEY$
9665 IF A$="1" THEN GOTO 10
9666 IF INKEY$="3" THEN LOAD ""
9667 IF A$="2" THEN GOTO 9650
9670 PRINT AT 18,0;"
E YOU SURE                  AR
  (Y/N)
  ?
9675 PRINT AT 21,0;"
9680 IF INKEY$="Y" THEN NEW
9690 IF INKEY$="N" THEN GOTO 964
0
9700 GOTO 9670
```

GOLF

```
  10 BORDER 4: PAPER 4: INK 0: C
LS
  20 PRINT  AT 0,13;"GOLF"
  30 PRINT  AT 2,0;" The idea of
 the game is to aim the golf bal
l into the hole.    You will hav
e control of:-"; AT 6,0;"Velocit
y - positive values up to
     50.
                          Angle
  - positive values up to   <
  40 PRINT  AT 12,4;"Play lasts
for 9 holes."; AT 14,0;"Press an
y key to commence play.": PAUSE
0
  50 CLS : LET br=100
  60 FOR a=0 TO 39: READ b: POKE
 USR "a"+a,b: NEXT a: LET t=0

  70 FOR a=1 TO 9: LET s=1: LET
h= INT (100+ RND *150)
  80 PAUSE 50: CLS : PRINT  AT 2
0,0; INK 7;"B"; AT 21,0;"C": CIR
CLE h+4,2,2: PLOT h+4,2: DRAW 0,
20: DRAW -4,-4: DRAW 4,-4: PRINT
  AT 0,0;"Shot number=";s; AT 2,
0;"Hole number=";a; AT 4,0;"Yard
s to hole=";h
  90 INPUT "Velocity ";u: IF u>5
0 OR u<0 THEN  GO TO 90
 100 INPUT "Angle ";z: IF z>80 O
R z<10 THEN  GO TO 100
 110 LET u=u-1: LET z=z* PI /180
: PRINT  AT 20,0; INK 7;"D"; AT
21,0;"E": BEEP .5,30
 120 FOR x=0 TO 255
 130 LET w=x/(u* COS z): LET y=w
*(u* SIN z-4.9*w): IF y<0 AND x>
0 THEN  GO TO 160
 140 PLOT  INK 7;x+4,y
 150 NEXT x
 160 LET s=s+1: LET h= ABS (h-x)

 170 IF h <= 10 THEN  GO TO 190

 180 GO TO 80
 190 CLS
 200 IF h=0 THEN  PRINT  AT 1,0;
"You have managed to drive the
 ball into the hole.": LET t=t+s
-1
 210 IF h>0 THEN  PRINT  AT 0,0;
"Your ball lands on the green an
dyou manage to putt the ball wit
hyour next shot.": LET t=t+s
 220 PRINT  AT 4,0;"Your scoreca
rd to date is:-"; AT 6,0;t;" sho
ts taken for ";a;" holes."; AT 1
0,0;"Press any key to continue p
lay."
 230 PAUSE 0: NEXT a: IF t<br TH
EN  LET br=t: PRINT  AT 10,0;"Yo
u have completed the best    ro
und of golf on this course by sc
oring a ";br;"."
 240 PRINT  AT 15,0;"Press any k
ey for another game.": PAUSE 0:
RESTORE : GO TO 60
 300 DATA 240,240,112,48,16,16,1
6,16
 310 DATA 6,6,196,132,140,148,17
2,244
 320 DATA 4,4,11,17,17,17,17,17

 330 DATA 12,12,8,8,62,42,42,42

 340 DATA 60,8,60,74,74,74,74,90
```

This game of Golf is played over nine holes and the aim is, of course, to hit your ball into the holes using as few strokes as possible. You choose the velocity and angle of the golf ball, the computer will do the rest.

Written for the Spectrum by David Yates.



QUESTLINE

Spiderman and The Sandman Cometh

Cathy Foot looks at Spiderman, the latest in the Questprobe series, and The Sandman cometh, from Stardreams.

PSST — hey, you out there — wanna trade places with Spiderman? You can now, you know!

There is never a dull moment in this job — only yesterday I was **Spiderman,** opening lift gates with my super spider powers, since I had become tired of waiting for a lift that would not come, climbing up the lift shaft, and generally being Spiderman to the best of my poor ability.

There I was, trying my wings as Spiderman for the first time. I knew already that I was expected to move in three dimensions in this game, rather than its being all on the same level — it was for this reason that I was told not to map the games being reviewed this month, after all — but the durn lift would not come and I was unable to find the stairs, so I exerted my spider powers and snapped those gates open — still no lift! Ah, well, now was as good a time as any to find out whether I was Spiderman or Peter Parker at that moment. I stepped out bravely into the void and found myself clinging to the side of the lift shaft. I tried going down, but "something stops me".

The Health and Safety boys slipped up badly over the fire regulations on this building, since the only means of access between floors seems to be a non-operating lift: I found no sign of a staircase taking off from any of the lobbies nor even any way out of the building for anyone not in the posession of super powers.

But the building is even weirder than that — what I have said so far merely makes it a fire trap. Take a GOOD look at the design of this building, I'm VERY glad I was specifically told NOT to produce any maps for this month's issue! Have you spotted what is wrong with the building yet? Take it very slowly — open the lift doors and go up a floor; you come out onto a very small amount of floor space, so small that it consists of only the waiting room.

There is an exit from the waiting room, but you NEED to be a Superhero to take it, since, when you go west from here it is punningly correct for a normal person, because you find yourself clinging to the OUTSIDE wall at the TOP of a skyscraper (you can get onto the roof of the building too, by the way!).

Now go back in, re-enter the lift shaft and go up a floor, where you will find five rooms cunningly balanced on top of the ONE room below them, and one floor ABOVE the top floor. The Planning Department must have been drunk to a man when they passed this one! Euclid's enemies strike again!

While wandering round this aMAZEing building you will discover many enemies going about their nefarious businesses — or should I say "staying" about their businesses, since they never seem to leave their rooms. Funny, that. For a moment, at least, I thought I was in the Daily Bugle offices, but even Jonah would not employ these guys.

The only thing that I have found for sure that works in the room with the gem fragment and the Natter Energy Egg, is to back out again fast, otherwise you need to take an interesting side trip into Limbo — somewhere below Heaven and above Earth, I gather — before getting back to the nitty-gritty of solving the game and saving the world.

Another problem I hit was in playing around with the chemicals — you always seem to have too many to be able to mix them together but, since the Spectrum recognises the word "mix," it must be possible to mix them somehow. Try a stricter segregation between the ingredients you want to mix and the rest — such as putting a closed door between them.

One of the more pleasant aspects of this game is the ease with which one can shrug off one's disappointments. Somehow, finding that the solution of the first problem leads directly to the emergance of a fresh one can be accepted with equanimity — like the problem of walking about on

To: Questline, Sinclair Programs,
Priory Court, 30–32 Farringdon Lane,
London EC1

From: .....

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HELP OFFERED .....

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.....

walls. Something stops me. Since it cannot be sheer terror that stops Spiderman, it is more than likely to be problems with web. Yes, web dispensers are empty. O.K. that must be what some of the chemicals are for, to make some more. Even if this is not what is stopping me from moving over the sides of the building, Spiderman cannot fight with empty web dispensers. It would be like asking James Bond to fight with an empty gun.

If you remember that Spiderman is never a vandal, you may save yourself time and effort, although there is at least one place where he is allowed to break something — he is allowed to remove some wire mesh in order to enter the ventilation system.

At no time in Spiderman did I actually get down and chew the carpet in rage and frustration, although other games have left their mark and, until SOMEONE invents a logical, acceptable vocabulary AND MAKES IT STICK, there will always be programs best worked at from inside a padded cell and with expert medical advice on hand.

There is another category of adventures — the "too clever by half" school and, unfortunately, it is here that **The Sandman Cometh** belongs. Sure, once you discover what is going on, everything makes sense, but so what?

It took me ages to get into The Sandman Cometh. I get a distinct feeling that they were impressed by **Mindbender** from Gilsoft — so was I — but this program is too complicated for my liking, if only because I found no satisfaction in solving any of the problems set.

I must admire the SCREEN$. When that came up I quivered with anticipation, if the program was as titillating I was in for something really good. I could hardly wait! Then came a string of disappointments; first one of my cats walked across the keyboard while I was out of the room, and, in so doing, broke into the program for me. I have no idea how it was done all I know is that it CAN be broken into. Next I could not get through the door. It took me ages to find the key — I forgot I had been told where to find it — "tmcdq sgd lzs." If you also need to know, move the letters in that phrase on by one.

On the other side of the door lies a corridor with rooms off it on either side. These rooms are best tackled in the order that you come to them, as they get progressively more difficult and, while it is not too obvious at the start, if you have not coped with the first one, you lack the information, etc., to tackle subsequent ones.

The first time I went through I was just browsing, with the result that the only thing that happened in the Cheddar Cat's room was that I picked up some items and the lifejacket disappeared in a puff of smoke, but I got out asleep. I was shot dead by the gunslinger in the third room, and woke up, and could do nothing at all in the 007 cell. There, before I awoke, I was told that I had tackled this room out of turn and in a state of unpreparedness, which was true enough, but rather depressing.

Then the universe folds itself. I have crossed this point, but some things should be left undisclosed.

Let us go more fully into what lies beyond the first door, on which is written "All The Fun Of." Inside you are looking at a fairground. There are only two routes you can take. It would appear that you are not allowed to walk on the grass, so take the paths and use the compass given; but before you do, pick up the mallet and stake, you do need them.

I would suggest you then take a trip on the Ghost Train, which offers a better than average ride — all the way to Transylvania where, as you can guess, you find a use for the mallet and stake. You cannot take the round trip by train, but there is a way through if you don't mind getting wet which takes you back to the fairground and your next problem — the Shooting Gallery.

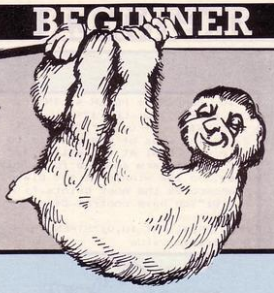
Best of luck, and keep calm.

I think it fair to say that if you enjoy games like Mindbender, and can cope with the lateral thinking and variable vocabularies without too much frustration, you may well enjoy this game — I did not.

Spiderman is produced by Adventure International, 85 New Summer Street, Birmingham and costs £9.95.

The Sandman Cometh is produced by Star Dreams, 17 Barn Close, Seaford, East Sussex and costs £10.95.

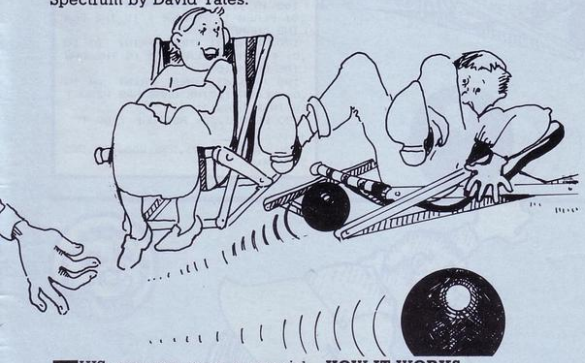
Programming—Slow and easy with Computer Sloth



BOWLING

AIM YOUR bowling ball at the white jack. Points will be awarded for accuracy and the winner will be the player with the most points at the end of the game. You have control of both the strength and the bias of the ball.

Bowling was written for the Spectrum by David Yates.



THIS program uses a special graphic character. It is indicated in this listing as an underlined "A". To enter, press "A" in graphics mode (Caps shift/9).

VARIABLES

A variable is a name you give a value which will then tell your Spectrum where the value is stored in memory. A list of the important variables will help you to understand how Bowls works.

j1 and j2 are scores for the two players

e is the strength of a bowl (measured as the number of pixels or adjacent dots the bowl will run on the screen).

f is the bias of a bowl (measured as the maximum number of pixels the bowl can deviate either side of a straight run).

z and y are the coordinates of the jack, selected randomly for each bowl.

d is the player number (1 or 2).

HOW IT WORKS

Line	
10	Sets screen colours and scores to zero.
20-40	Print instructions and wait for key press to start.
50	Reads data for the User Defined Graphic representing a ball (bowl or jack) and POKEs into graphic "A".
60	Starts looping for a five bowl count (loop counter c). Calls subroutine at lines 110-120 to find coordinates of the jack. Starts loop for player number (loop counter d).
70-80	Prompt player d for strength and bias and check that answers are within limits. Reset amount of deviation (h) to zero.
90	Loop on pixel count for strength of bowl (counter g). Calculates x coordinate of bowl for each y pixel move. The bowl always starts with x=125 pixels on the bottom row (i.e. y=g=0). The deviation is given by f* sin h, where h is incremented by PI/280 for each loop. This gives a sine wave pattern with a maximum swing (plus or minus depending on sign of bias) at 140 pixel rows up from the bottom of the screen.
100	Calls the subroutine at lines 130 to 140 to calculate the score. Loops back for next player. Calls subroutine at line 150 to print scores for both players on each bowl and loops back for next bowl.
110-120	Subroutine to calculate and print random coordinates of jack.
130-140	Subroutine to work out scores. i1 and i2 are x and y distances between bowl and jack, with i as the resultant. Maximum score for one bowl is 100. Score is added to appropriate player's total score.
150	Subroutine to print score, and return for next bowl.
160-180	Print final score when five bowls each played.
190	Re-run.
2000	Data for UDG.

Continued on next page

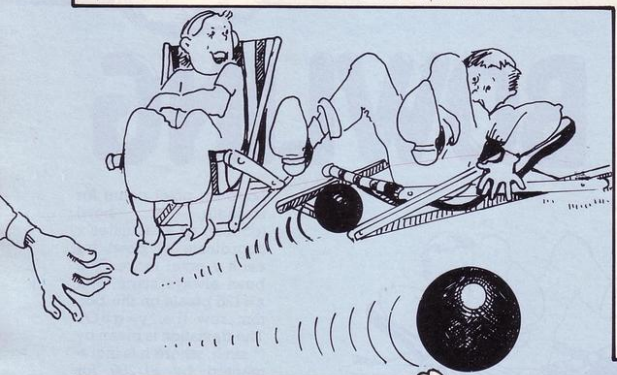
```
 10 BORDER 4: PAPER 4: INK 0:
CLS : LET j1=0: LET j2=0
 20 PRINT AT 0,12;"BOWLS"; AT
2,0;" The idea of the game is to
 aim your bowl at the white jac
k'. Points are awarded for accu
racy,and the winner is the playe
r whoscores the most points."; A
T 8,0;"You have control of:-"

 30 PRINT AT 10,0;"STRENGTH -
A positive value
between 0 & 170."; AT 13,0;"BIAS
  - +ve/-ve values up to
 125."; AT 16,0;"NB.Positi
ve values will cause deviation
 to the right, whilst negative
values to the left."
 40 PRINT AT 20,0;"Press any k
ey to commence play (lasting fo
r 5 bowling 'ends')."; PAUSE 0:
CLS
 50 FOR a=0 TO 7: READ b: POKE
USR "a"+a,b: NEXT a

 60 FOR c=1 TO 5: GO SUB 110: F
OR d=1 TO 2
 70 INPUT "Strength ";e: IF e>1
70 OR e<0 THEN GO TO 70
 80 LET h=0: INPUT "Bias ";f: I
F f<-125 OR f>125 THEN GO TO 80

 90 FOR g=0 TO e: PLOT INK d;i
25+(f* SIN h),g: BEEP .01,(d*20)
: LET h=h+( PI /280): NEXT g
 100 GO SUB 130: NEXT d: GO SUB
150
 110 LET x= INT (3+ RND *24): LE
T y= INT ( RND *15): PRINT AT 2
1,15;"A"; AT y,x; INK 7;"A"
 120 LET x=(x*8)+4: LET y=((21-y
)*8)+4: RETURN
 130 LET i1= ABS (x-125-(f* SIN
h)): LET i2= ABS (y-e): LET i=10
0-( INT ( SQR ((i1↑2)+(i2↑2))))

 140 LET j1=j1+((2-d)*i): LET j2
=j2+((d-1)*i): RETURN
 150 PRINT AT 0,0;"Player 1=";j
1; AT 0,15;"Player 2=";j2: BEEP
1,45: CLS : NEXT c
 160 IF j1>j2 THEN PRINT AT 10
,0; FLASH 1;"PLAYER 1 IS THE BOW
LING CHAMPION"
 170 IF j2>j1 THEN PRINT AT 10
,0; FLASH 1;"PLAYER 2 IS THE BOW
LING CHAMPION"
 180 IF j1=j2 THEN PRINT AT 10
,0; FLASH 1;"THE GAME HAS RESULT
ED IN A DRAW!"
 190 BEEP 5,30: RESTORE : GO TO
10
 200 DATA 60,126,255,255,255,255
,126,60
```



STOP THAT FENCE

In the centre of the screen appears Fred (represented by an O). Fred is a determined man and, at the moment, he is determined that no new fences will be erected in his home town of Molesworth. Unfortunately, a fence is being erected at the top of the screen. Fred plans to cut through the fence.

Control Fred with the cursor keys 5, 8 and 0.

Stop that Fence was written for the Spectrum by Hal Pawson of north London.

```
  1 LET s= PI - PI
  2 LET x=5
  3 LET y=3*x
  4 PRINT AT x,y-1;" O "
  5 LET h=1
  7 GO SUB 1000
  8 GO SUB 4000
 10 LET y=y+( INKEY$ ="8" AND y
<30)-( INKEY$ ="5" AND y>0)
 15 PRINT AT x,y-1;" O "
 20 IF INKEY$ ="0" THEN GO SU
B 2000
 30 GO SUB 1000
 40 GO SUB 4000
 50 GO TO 7
1000 LET r= INT ( RND *31): PRIN
T AT h,r;"=": RETURN
2000 IF SCREEN$ (h,r)="=" THEN
 LET s=s+1
2010 FOR n=4 TO 1 STEP -1: PRINT
 AT n,y;"†"; AT n+1,y;" ": NEXT
 n: RETURN
4000 LET q=0
4010 FOR n=1 TO 30
4020 IF SCREEN$ (h,n)="=" THEN
 LET q=q+1
4030 NEXT n
4040 IF q=30 THEN GO SUB 5000

4050 RETURN
5000 CLS : PRINT "THE WALL IS CO
MPLETE" "YOU HAVE SCORED";s
```

Join The Dots

The numbers 1 to 9 appear on the screen. Touch the numbers, in numerical order, with your glowing tail. When you have finished, press S to see how many moves you made. Move with the cursor keys, 5 to 8.

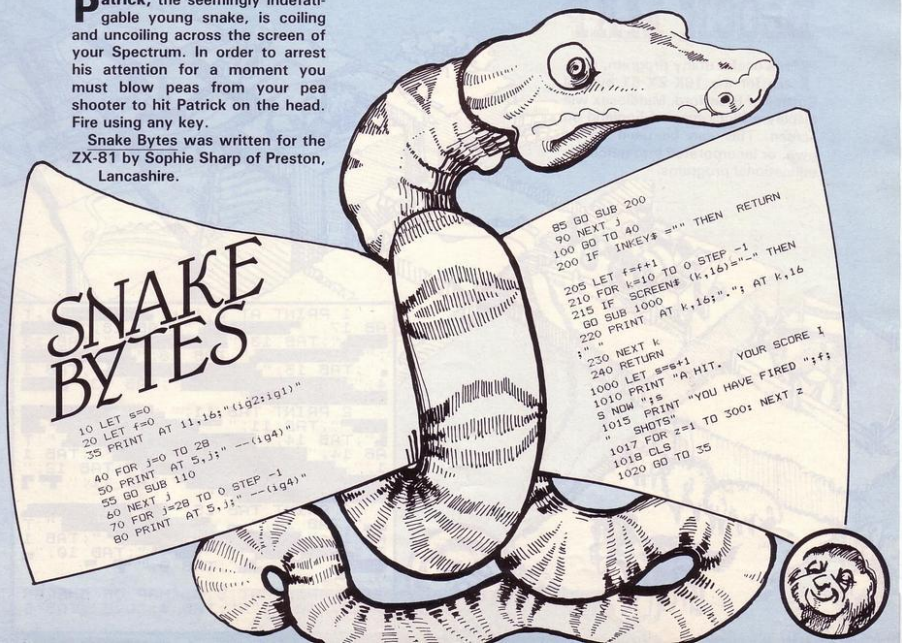
Join the Dots was written for the ZX-81 by J Borrett of Truro, Cornwall.

```
  1 LET a=0
 10 FOR f=1 TO 9
 20 PRINT  AT  INT ( RND *10),
INT ( RND *10);f
 30 NEXT f
 40 LET x=30
 50 LET y=x
 60 LET x=x+( INKEY$ ="8")-( IN
KEY$ ="5")
 70 LET y=y+( INKEY$ ="7")-( IN
KEY$ ="6")
100 PLOT x,y
101 LET a=a+1
105 IF  INKEY$ ="s" THEN  GO TO
500
110 GO TO 60
500 CLS
505 PRINT "YOU TOOK";a;"  MOVE
S"
```

SNAKE BYTES

Patrick, the seemingly indefatigable young snake, is coiling and uncoiling across the screen of your Spectrum. In order to arrest his attention for a moment you must blow peas from your pea shooter to hit Patrick on the head. Fire using any key.

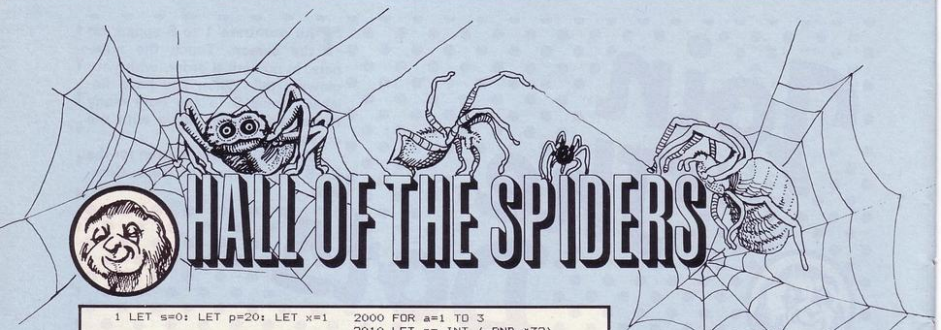
Snake Bytes was written for the ZX-81 by Sophie Sharp of Preston, Lancashire.



```
10 LET s=0
20 LET f=0
35 PRINT  AT 11,16;"(i@2:i@1)"

40 FOR j=0 TO 28
50 PRINT  AT 5,j;" --(i@4)"
55 GO SUB 110
60 NEXT j
70 FOR j=28 TO 0 STEP -1
80 PRINT  AT 5,j;" --(i@4)"
85 GO SUB 200
90 NEXT j
100 GO TO 40
200 IF  INKEY$ ="" THEN  RETURN

205 LET f=f+1
210 FOR k=10 TO 0 STEP -1
215 IF  SCREEN$ (k,16)="-" THEN
 GO SUB 1000
220 PRINT  AT k,16;".";  AT k,16
;" "
230 NEXT k
240 RETURN
1000 LET s=s+1
1010 PRINT "A HIT.  YOUR SCORE I
S NOW ";s
1015 PRINT "YOU HAVE FIRED ";f;
"  SHOTS"
1017 FOR z=1 TO 300: NEXT z
1018 CLS
1020 GO TO 35
```



HALL OF THE SPIDERS

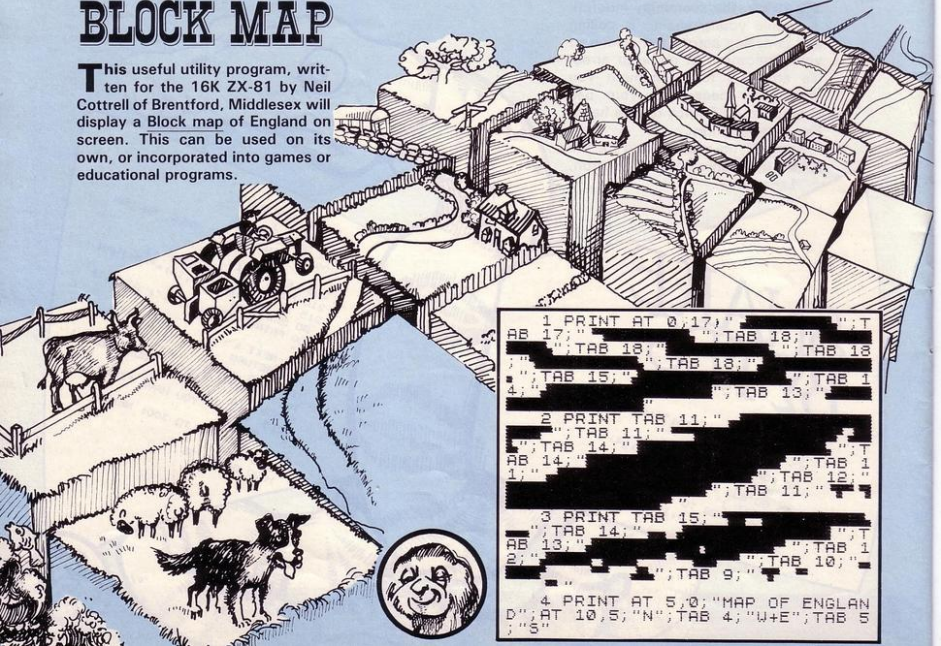
```
  1 LET s=0: LET p=20: LET x=1
  2 FOR a=1 TO 30: PRINT  AT x,
a;"m": NEXT a
  3 LET b=1: LET c=40
 20 IF b=30 THEN  GO SUB 4000
 30 GO SUB 1000
 40 IF b=c THEN  GO SUB 3000
 50 IF  INKEY$ ="8" THEN  LET b
=b+1
 60 IF  SCREEN$ (p,b+1)="." THE
N  GO SUB 3000
 70 PRINT  AT p,b;" O"
 80 GO SUB 2000
 90 GO SUB 20
1000 LET c= INT ( RND *31)
1010 FOR a=2 TO 20
1020 PRINT  AT a,c;"."
1030 NEXT a
1040 RETURN
2000 FOR a=1 TO 3
2010 LET c= INT ( RND *32)
2020 FOR d=20 TO 2 STEP -1
2030 PRINT  AT d,c;" "
2040 NEXT d
2050 NEXT a
2060 RETURN
3000 CLS
3010 PRINT " YOU HAVE BEEN CAUGH
T"
3020 PRINT " YOUR SCORE IS ";s
3030 STOP
4000 CLS
4010 LET s=s+1
4020 PRINT "YOU HAVE COMPLETED "
;s;" CROSSINGS"
4030 PAUSE 100
4040 CLS
4050 GO TO 10
```

No one has ever passed through the Hall of the Spiders and survived. Now you aim to do just that. Avoid their sticky threads and you will come through alive. The smallest touch of a thread will leave you a helpless prisoner to be eaten by the spiders. Move through the hall using keys 5 and 8 to move left and right. How many halls can you cross and survive?

Written for the Spectrum by Chloe Stapleton-Hall of Howarth, Yorkshire.

BLOCK MAP

This useful utility program, written for the 16K ZX-81 by Neil Cottrell of Brentford, Middlesex will display a Block map of England on screen. This can be used on its own, or incorporated into games or educational programs.



```
  1 PRINT AT 0,17;"          ";T
AB 17;"          ";TAB 18;"
          ";TAB 18;"          ";TAB 18
;"          ";TAB 18;"          "
;TAB 15;"          ";TAB 1
4;"          ";TAB 13;"
          "
  2 PRINT TAB 11;"
          ";TAB 11;"
          ";TAB 14;"          ";T
AB 14;"          ";TAB 1
1;"          ";TAB 12;"
          ";TAB 11;"
          "
  3 PRINT TAB 15;"
          ";TAB 14;"          ";T
AB 13;"          ";TAB 1
2;"          ";TAB 10;"
          ";TAB 9;"
          "
  4 PRINT AT 5,0;"MAP OF ENGLAN
D";AT 10,5;"N";TAB 4;"W+E";TAB 5
;"S"
```

50 COPIES OF SWORDMASTER FROM ADVENTURE INTERNATIONAL TO BE WON

Swordmaster is the result of a collaboration between Adventure International and Steve Jackson of Games Workshop. The result is a unique combination of book and computer game which Adventure International consider to be the best computerised version of Dungeons and Dragons ever produced.

The game begins as you take your Swordmaster to training school. You emerge from that school with a rating which you carry with you into the game. The body of the game takes you into the elaborate world of dungeons and dragons. Each location you enter is described in detail in the accompanying book, but the monsters which you meet are assigned by locations by the computer at the start of each game and so cannot be expected or avoided.

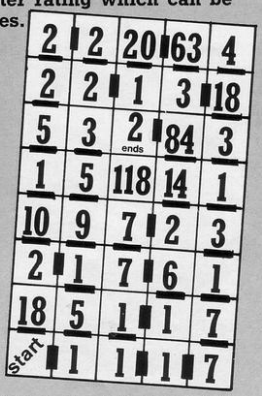
On completion of the game you attain a new swordmaster rating which can be carried on into forthcoming games in the Swordmaster series.

HOW TO ENTER. The diagram shows a collection of rooms, some of which are linked with doors, all of which contain monsters of different strengths. Your first task is to work out the quickest route from start to finish without visiting any room more than once. The number of rooms that you have visited, including the start and finish is your first answer.

Now look at the strengths of the monsters as you follow this route. You start with a strength of 100. The first time you meet a monster you lose in battle, but you beat the next monster that you meet. This pattern of a loss followed by a win continues until you reach the very last room. Whenever you win, your strength is multiplied by the strength of the monster in that room. Whenever you lose, your strength is divided by the strength of the monster in that room. What is your final strength?

Fill in the two answers together with your name and address on the entry form in this issue and post it to us to arrive by the end of March 1985.

Employees of EMAP and Adventure International are not eligible to enter. The editor's decision in all matters concerning the competition is final.



I HAD TO CROSS ..... ROOMS

MY FINAL STRENGTH WAS .....

MY FAVOURITE COMPUTER GAME IS .....

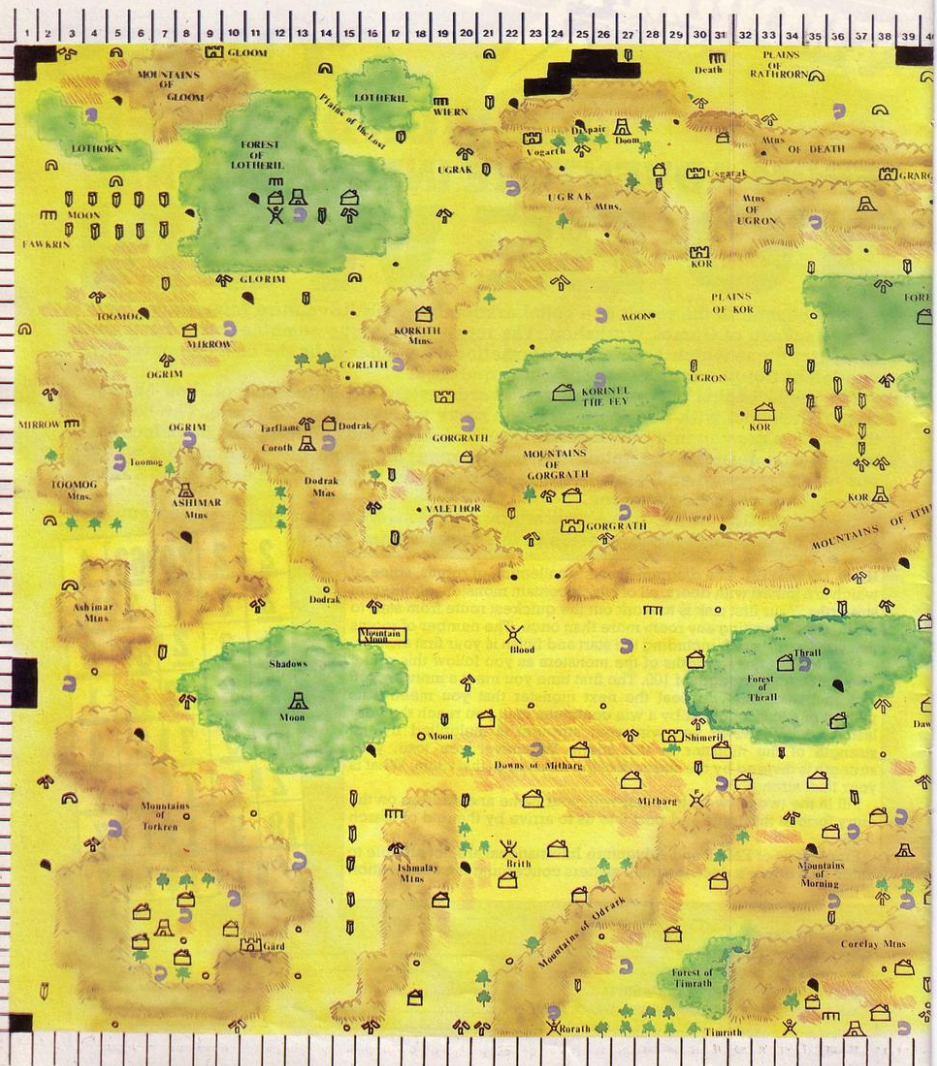
MY LEAST FAVOURITE COMPUTER GAME IS .....

NAME .....

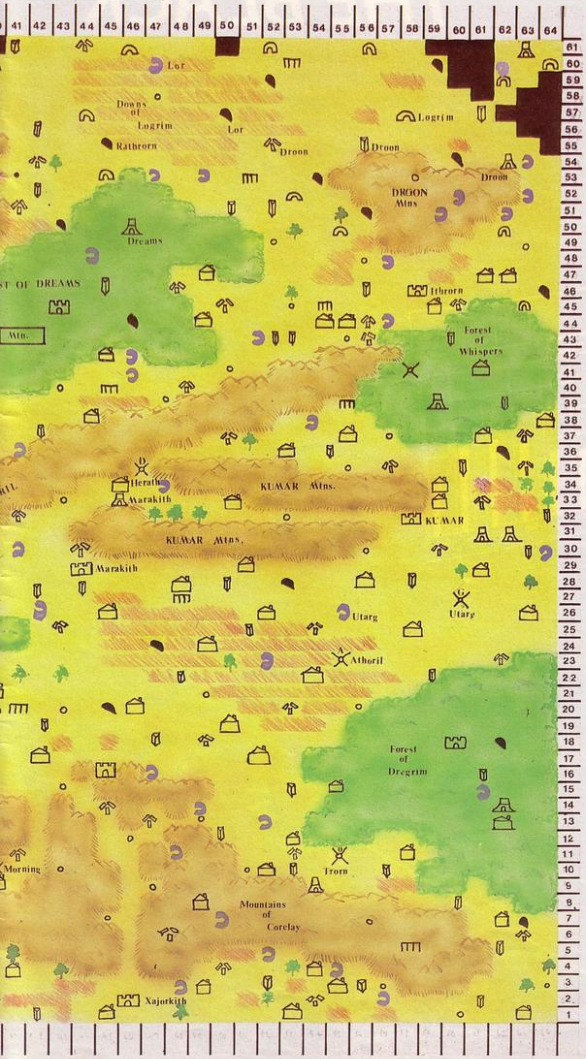
ADDRESS .....

.....

THE LORDS O


GLOOM
MOUNTAINS OF GLOOM
LOTHERIL
WIERN
Plains of the Last
LOTHORN
FOREST OF LOTHERIL
UGRAK
Despair
Vogarth
Doom
Death
PLAINS OF RATHORN
Mtns OF DEATH
UGRAK Mtns.
Mtns OF UGRON
MOON
FAWKRIN
GLORIM
KOR
PLAINS OF KOR
TOOMOG
MIRROW
KORKITH Mtns.
MOON
OGRIM
CORLITH
KORINEL THE FEY
UGRON
MIRROW
OGRIM
Tarflame
Dodrak
Coroth
GORGRATH
KOR
Toomog
TOOMOG Mtns.
ASHIMAR Mtns
Dodrak Mtns
VALETHOR
MOUNTAINS OF GORGRATH
GORGRATH
KOR
Ashimar Mtns
Dodrak
Mountain Mtns
Blood
Shadows
Moon
Thrall
Forest of Thrall
Moon
Downs of Mitharg
Shimeril
Mitharg
Mountains of Torkren
Ishmalay Mtns
Brith
Mountains of Morning
Mountains of Ofrark
Gard
Corelay Mtns
Forest of Timrath
Rarath
Timrath

OF MIDNIGHT

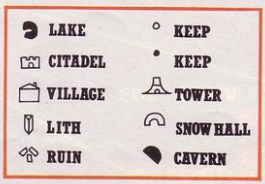


THIS map of the **Lords of Midnight** was compiled for *Sinclair Programs* by John Rundle, and drawn by Brian Cookman.

The list below gives the names of the Lords of Midnight, the numbers of guards, warriors and riders which they command, the key which controls them, and their start location. The number of the start location refers to the grid numbers around the edges of the map.

Although a grid is not shown, the map is drawn to scale, and connecting the grid guidelines around the edge will show accurately where one area begins and another ends.

Place	Key	Lord	Gua	Warr	Ride
1321	C	Luxor	—	—	—
1321	V	Morkin	—	—	—
1321	B	Corleth	—	—	—
1321	N	Rothron	—	—	—
1106	1	Gard	600	1000	500
4429	2	Marakith	700	1000	500
4602	3	Xajorkith	750	1200	800
0961	4	Gloom	600	1000	500
2919	5	Shimeril	750	1000	800
5832	6	Kumar	600	1000	700
5846	7	Ithrorn	530	195	935
4516	8	Dawn	550	800	500
4345	9	Dreams	550	1200	800
5620	0	Oregrim	500	1000	800
5523	A	Athoril	130	290	800
4635	D	Herath	60	415	430
1224	E	Shadows	—	1000	—
3015	F	Mitharg	250	600	500
6027	G	Utarg	350	—	1000
2401	I	Rorath	250	400	800
5511	O	Troran	150	800	400
4010	P	Morning	175	785	295
3401	Q	Thimrath	300	400	600
1251	R	Lothoril	200	500	200
2225	S	Blood	400	—	1200
2440	T	Korinel	—	875	—
2212	U	Brith	150	600	300
5841	W	Whispers	150	600	300
3423	Y	Thrall	—	600	300
6361	J	Lorgrim	—	—	—
0251	H	Fawkrin	—	—	—
1338	K	Farflame	—	—	—



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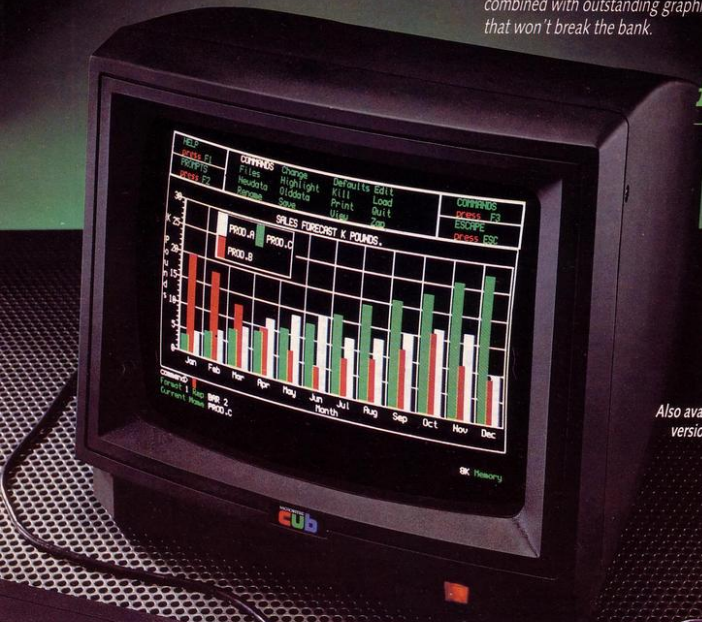

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LEAP FROG

Listing 1

```
  10> FOR f= USR "a" TO  USR "f"
+7
  20 READ a: POKE f,a: NEXT f
  30 DATA 4,10,31,62,110,245,184
,110,32,80,248,124,118,175,29,11
8,0,255,255,0,52,52,52,52
  40 DATA 52,52,52,52,0,126,0,25
5,0,255,51,204,0,0,0,0,24,60,126
,219,24,24,24,24
```

Five green frogs sit on your left, five red frogs sit on the pillars on your right. For some reason, the red frogs want to sit on the left of the screen, and the green frogs want to sit on the right of the screen. Being lazy creatures they want to accomplish this in as few moves as possible.

It is only possible for frogs to jump onto an empty pillar, and they cannot jump over more than one frog at a time. How quickly can you transfer the frogs?

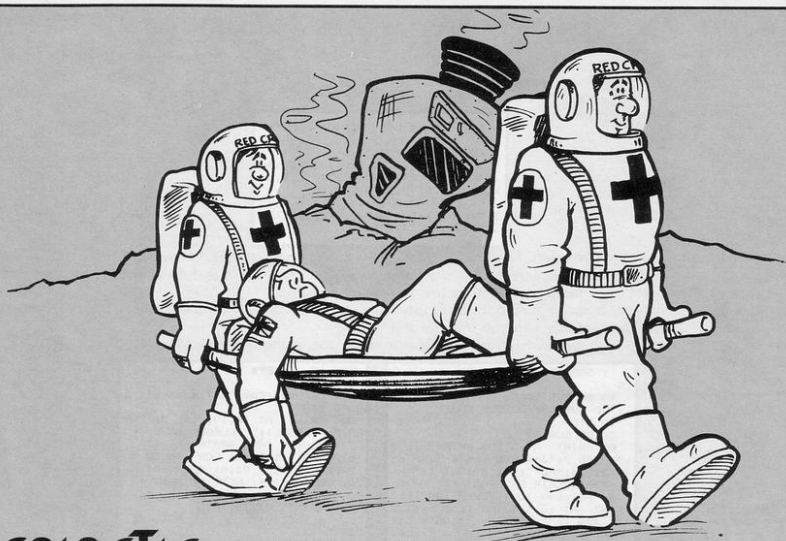
Leap Frog was written for any Spectrum by Joe Stanton of Cromer, Norfolk.

Listing 2

```
  1 BORDER 0: PAPER 0: INK 7: C
LS
  10 GO SUB 9000: GO SUB 50: CLS
 : GO SUB 90: GO SUB 100
  20 STOP
  50 GO SUB 90
  55 PRINT  AT 3,14; BRIGHT 1;"B
y"; TAB 7;"Joe Stanton © 1985";
AT 21,14;"For";#0; BRIGHT 1;"
   ""SINCLAIR PROGRAMS"""
  60 FOR i=0 TO 7: BEEP .002,i:
PRINT  AT 10,12; INK i;"Press...
"'' TAB 7;""1"" for ""INSTRUCTI
ONS""''' TAB 7;"""P"" to ""PLAY
"""
  65 IF  INKEY$ ="i" THEN  GO TO
 1000
  70 IF  INKEY$ ="p" THEN  RETUR
N
  75 NEXT i: GO TO 60
  95 RETURN
 100 PRINT  AT 10,6; BRIGHT 1; I
NK 4;"A A A A A   "; INK 2;"B B
 B B B"; TAB 6; INK 5;"C C C C C
 C C C C C"; TAB 6;"D D D D D D
 D D D D D"; TAB 6; INK 6;"EEEEE
EEEEEEEEEEE"
 105 PRINT  AT 14,16;"F"
 110 PRINT  AT 5,13;"MOVE:";mv
 120 IF  INKEY$ ="w" AND x<25 TH
EN  PRINT  AT 14,x;" "; AT 14,x+
2;"F"; LET x=x+2: BEEP .01,50
 130 IF  INKEY$ ="q" AND x>6 THE
N  PRINT  AT 14,x;" "; AT 14,x-2
;"F": LET x=x-2: BEEP .01,50
 140 IF  CODE  INKEY$ =13 THEN
GO TO 500
 150 PAUSE 0: GO TO 120
 500 BEEP .02,20: LET from=(x-4)
/2
 510 IF from=to THEN  GO TO 600

 520 IF from>to THEN  IF from-to
>2 THEN  GO TO 600
 530 IF to-from>2 THEN  GO TO 60
0
 540 LET z$=a$(to): LET a$(to)=a
$(from): LET a$(from)=z$
 550 LET i=4: IF a$(to)="B" THEN
  LET i=2
 560 PRINT  AT 10,from*2+4;" ";
AT 10,to*2+4; INK i;a$(to)
 570 IF a$=b$ THEN  GO TO 700
 580 IF  INKEY$ <> "" THEN  GO
TO 580
 590 LET to=from: LET mv=mv+1: G
O TO 110
 600 PRINT  AT 18,10; INK 5; PAP
ER 3; FLASH 1;" ILLEGAL MOVE ";
AT 19,10;"  TRY  AGAIN  "
 610 FOR f=1 TO 3: FOR n=0 TO 20
 STEP 2: BEEP .01,n: BEEP .01,n+
20: BEEP .01,f: NEXT n: NEXT f

 620 PRINT  AT 18,10;"
    "; TAB 10;"                "
GO TO 110
 700 FOR f=0 TO 7: FOR i=0 TO f:
 BEEP .01,i: PRINT  AT 16,12; IN
K i;"GAME OVER"; AT 18,11;"WELL
 DONE": NEXT i: NEXT f
 710 PRINT  AT 21,5;"You did it
in ";mv;" moves";#0;"          Pr
ess Any Key": PAUSE 1: PAUSE 0:
RUN
1000 CLS : PRINT  AT 2,5;"O.....
...Move Arrow Left"'' TAB 5;"W..
.....Move Arrow Right"'' TAB 5;"
"ENTER"".....Frog Jump"
1005 PRINT  AT 10,0; INK 5;"  Th
e object of the game is to  move
 the green frogs onto the  pill
ars occupied by the red  frog
s & visa versa, in as few  move
s as possible."
1010 PRINT ' INK 6;"  The frogs
cannot jump more  than one oth
er frog at a time."
1015 PRINT ' INK 3;" When the f
rogs jump they jump onto the emp
ty pillar."
1020 PAUSE 20: PRINT #0;"
Press Any Key...": PAUSE 20: INP
UT "": IF  INKEY$ <> "" THEN  C
LS : GO TO 10
1025 GO TO 1020
9000 LET mv=0: LET x=16: LET to=
6
9005 LET a$="AAAAA BBBBB": LET b
$="BBBBB AAAAA"
9010 RETURN
9998 SAVE "Leap Frog" LINE 9999:
 SAVE "Graphics" CODE USR "a",4
8: PRINT  TAB 5;"Rewind Tape - V
erifying": VERIFY "": VERIFY ""
CODE : STOP
9999 LOAD "" CODE  USR "a": RUN
```



GALACTIC AMBULANCE

The date is 3000AD. Space has ceased to be the final frontier. The flying doctors of terrestrial Australia have been replaced by the Galactic Ambulance inter-planetary service.

Today you are the pilot of the galactic ambulance. Save as many hapless astronauts as possible by guiding the rescue pod around the asteroids, down to the astronaut, and back to the docking bay of the ship.

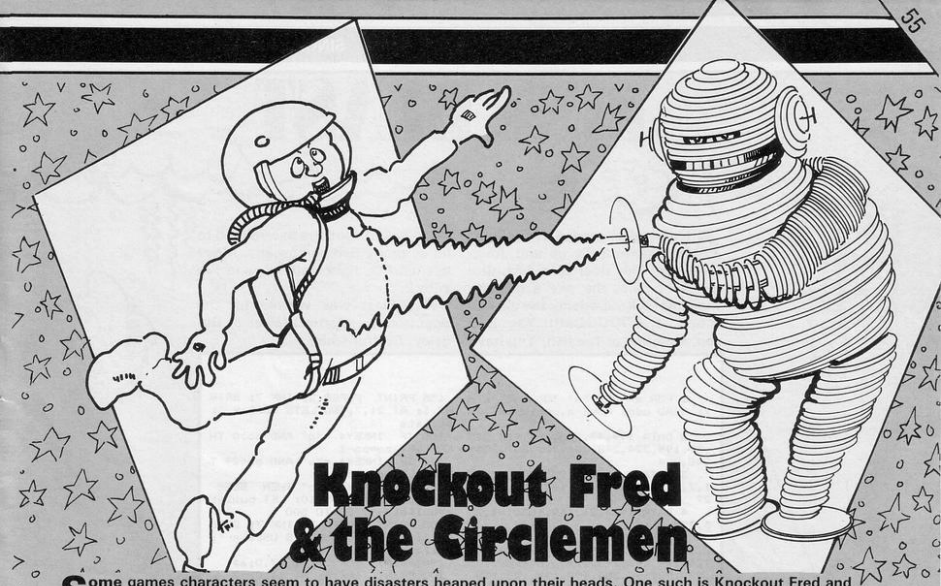
Written for the Spectrum by Andrew Cartwright of Wirral, Merseyside.

```
  1: LET h=10: BORDER 0: INK 7: PAPER 0: CLS
  2 FOR a= USR "a" TO  USR "m"+7: READ b: POKE a,b: NEXT a
  3 DATA 56,56,146,84,16,16,40,66,0,16,50,99,243,231,243,255,0,0,8,108,206,223,255,255,0,0,48,113,195,251,207,255
  4 DATA 0,30,57,121,125,63,30,0,4,2,2,15,63,108,216,255,0,0,0,255,153,255,255,255
  5 DATA 32,64,64,240,252,54,27,255,255,193,113,29,23,19,16,252

  6 DATA 255,131,142,184,232,200,8,63,1,1,3,6,12,31,2,6,24,126,255,24,60,255,24,0,128,128,192,96,48,248,64,96
  10 PRINT  AT 8,5;"GALACTIC AMBULANCE"; AT 10,2;"CONTROLS"; AT 12,2;"1 LEFT:2 RIGHT:0 DROP:0 THRUST": BEEP .05,0: BEEP .05,10: BEEP .05,1
  11 FOR P=0 TO 7: PRINT  AT 15,5; INK P;"PRESS 0 KEY TO PLAY": BEEP .002,P: NEXT P: IF  INKEY$ ="0" THEN  GO TO 13
  12 GO TO 11
  13 FOR P=0 TO 21: LET A= USR 3280: BEEP .002,10: NEXT P
  14 LET sh=25: LET l=5: LET sc=0: LET k=0
  20: LET y=3: LET s$="KLM":
  23 CLS : PRINT  AT 21,0;"BDBDCBBDCCBCDBDCDBDCCDBBCBCDBC"
  24 LET q= INT ( RND *28)+1: PRINT  AT 20,q; INK 5;" A "
  25 FOR x=4 TO 15 STEP 2: FOR z=1 TO K: BEEP .001,30: PRINT  AT x, INT ( RND *31);".": NEXT z: NEXT x:
  26 PRINT  AT 0,0; INK 7;"LIVES=";l;"   SCORE=";sc;"   HI=";h

  30 FOR f=p TO 0 STEP -1: PRINT  AT 1,f; INK 2;" FG+GH "; AT 2,f;" I"; AT 2,f+2; INK 6;s$; AT 2,f+5; INK 2;"J ": LET p=p-1: LET y=2: IF  INKEY$ ="O" THEN  GO TO 50
  40 BEEP .005,-10: NEXT f: PRINT  AT 1,f;"          "; AT 2,f;"          ": LET p=25: LET y=3: GO TO 30
  50 LET x=f+2: PRINT  AT 2,x;"  "
  60 IF  SCREEN$ (y,x)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  61 IF  SCREEN$ (y,x+1)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  62 IF  SCREEN$ (y,x+2)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  65 PRINT  AT y,x; INK 6;s$:
  66 BEEP .005,20-y: IF y >= 20 AND y=q THEN  GO TO 130
  67 IF y >= 20 AND x <> q THEN  LET l=l-1: GO SUB 2000: GO TO 22
  70 LET x1=x: LET y1=y: LET x=x+( INKEY$ ="2" AND x<29)-( INKEY$ ="1" AND x>1)
  80 IF  INKEY$ ="o" THEN  LET y=y-2: IF y=0 THEN  GO TO 26
  100 PRINT  AT y1,x1;"  "
  120 LET y=y+1: GO TO 55

  130 LET sc=sc+10: LET K=K+1
  170 BEEP .05,10
  180 PRINT  AT y,x;"  "
  190 LET y=y-1
  200 IF  SCREEN$ (y,x)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  210 IF  SCREEN$ (y,x+1)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  220 IF  SCREEN$ (y,x+2)="." THEN  LET l=l-1: GO SUB 2000: GO TO 22
  230 PRINT  AT y,x; INK 6;s$; AT y+1,x+1;"A": BEEP .005,20-y:
  240 IF y=2 AND x=f+2 THEN  FOR g=0 TO 30: BEEP .005,g: NEXT g: LET sc=sc+10: LET y=3: CLS : GO TO 23
  250 IF y=2 AND x <> f+2 THEN  LET l=l-1: GO SUB 2000: GO TO 22
  260 LET x1=x: LET y1=y: LET x=x+( INKEY$ ="2" AND x<31)-( INKEY$ ="1" AND x>0)
  280 PRINT  AT y1,x1;"  "; AT y1+1,x1+1;" "
  290 LET y=y-1: GO TO 200
2000 BEEP .05,-15: FOR Q=Y TO 20: PRINT  AT 0,X;"KLM"; AT Q-1,X;"  "; BEEP .002,Q: NEXT Q
2010 CLS : LET x=0: LET y=2: IF l=0 THEN  GO SUB 9996
2020 RETURN
9996 PRINT  AT 10,10;"GAME OVER": BEEP .05,-10: BEEP .05,10: PRINT  AT 12,5;"(PRESS A KEY TO PLAY)": PAUSE 0: CLS
9997 IF sc>h THEN  LET h=sc:
9998 GO TO 10
```



Knockout Fred & the Circlemen

Some games characters seem to have disasters heaped upon their heads. One such is Knockout Fred and the Circlemen. Fred is lost in a series of intergalactic tunnels. His only wish is to escape by using one of the teleport facilities on the screen. The deadly circle men appear at each side, trying to bar his way. Once he reaches the teleport Fred will find himself in another tunnel only, this time, the circle men move a little faster.

Written for the 16K ZX-81 by Neil Cottrell of Brentford, Middlesex.

Enter line one exactly as printed, and check carefully that all characters are correct, and that no spaces have been omitted before you attempt to run the program. Keywords in the middle of a line can be entered by pressing THEN, followed by the keyword. When the keyword is in place, return and delete THEN.

```
   1 REM Y ▚4▌ PRINT NOT LET 4 I
F TAN Y▚▚ REM ▌ PRINT NOT NOT NO
T LET 4 SAVE NOT NOT TAN
   2 PRINT "N.C. PRODUCTION",,"Y
OU ARE FRED AND YOUR AIM IS TO G
ET TO ETHER OF THE SIDES.TO    T
OUCH THE ECAPE TELEPORT ▒.BUT  I
TS NOT THAT EASY,THERE ARE 0,S T
RYING TO KNOCK YOU OUT.THEY    C
OME IN ROWS FROM BOTH SIDES.   Y
OU CAN DISTROY THEM BY SHOOTINGT
HEM WITH YOUR LAZER GUNS.AS    Y
OU SHOOT THEM BACK THEY KEEP   C
OMEING.IF YOU MAKE IT TO THE   E
XIT,YOU WILL BE TELEPORTED TO  T
HE NEXT TUNEL IN WITCH THE 0,S A
RE FASTER.EACH TIME YOU MAKE ITT
HEY COME FASTER UNTIL THEY     K
NOCK YOU OUT.ONCE THEY GET TO  A
 CERTAIN SPEED THEY GO BACK TO S
TARTING SPEED.THEY HAVE TO HIT Y
OU ON THE BONCE TO BOP YOU"
   3 PRINT "YOU HAVE THREE LIVES
 SCORE ONE  EACH TIME YOU GET TE
LEPORTED"
   4 POKE 16418,0
   5 PRINT "CONTROLS... 1=LEFT 2
=RIGHT       9=FIRE LEFT 0=FIRE R
IGHT","PRESS ANY KEY ""GOOD LUCK
"""
   6 IF INKEY$="" THEN GOTO 6
   7 CLS
  10 LET HS=0
  20 LET S=0
  21 LET H=.8
  24 LET L=3
  25 LET A$=""
  26 LET B$=""
  30 LET A=15
  40 LET B=13
  50 LET Z=31
  55 LET X=0
  60 PRINT AT 0,0;
  70 IF USR 1652. THEN
  75 PRINT AT 0,0;"LIVES=";L;AT
17,2;"▒";AT 17,29;"▒";AT 21,0;"S
CORE=";S
  80 PRINT AT . .0;
  90 IF USR 16514 OR USR 16514 T
HEN
 100 FOR N=0 TO 14
 110 PRINT AT N,B;"    ";TAB B;"▚
▙ ";TAB B;"▚▚"
 115 NEXT N
 120 PRINT AT A,B;" ▚▙ ";TAB B;
" ▚▚ ";AT 15,0;A$;AT 15,Z;B$
 130 IF B=26 OR B=1 THEN GOTO 60
0
 136 IF X=B+4 OR X=B+3 OR Z=B+2
OR Z=B+3 THEN GOTO 300
 140 LET W=RND
 150 IF W>H THEN LET A$=A$+"0"
 155 IF W>H THEN LET X=X+1
 160 IF W>H THEN LET B$=B$+"0"
 170 IF W>H THEN LET Z=Z-1
 180 LET B=B+(INKEY$="2")-(INKEY
$="1")
 181 IF INKEY$="0" THEN GOTO 500
 185 IF INKEY$="9" THEN GOTO 400
 200 GOTO 120
 300 LET L=L-1
 310 IF L<>0 THEN GOTO 25
 315 IF HS<S THEN LET HS=S
 320 PRINT AT 10,20;"GAME OVER",
TAB 0;"HIGH SCORE=";HS
 330 PAUSE 4E4
 340 GOTO 20
 400 IF X-0 THEN GOTO 190
 410 PRINT AT A,X-1;".";AT A,X-1
;" "
 415 LET X=X-1
 420 LET A$=A$( TO LEN A$-1)
 430 GOTO 120
 500 IF Z=31 THEN GOTO 190
 505 PRINT AT A,Z;".";AT A,Z;" "
 510 LET Z=Z+1
 520 LET B$=B$( TO LEN B$-1)
 530 GOTO 120
 600 LET H=H-.05
 605 IF H=0.2 THEN LET H=.8
 610 LET S=S+1
 620 PRINT AT 21,0;"YOU MADE IT
NEXT.NEXT LEVEL."
 625 PAUSE 100
 630 GOTO 25
9000 SAVE "KNOCKOUT FRED"
9990 RUN
```

FISH BLAST

A tranquil afternoon in summer. Fish swim lazily up and down the river. The river is a beautiful shade of blue, the sky a delicate shade of pink. Suddenly the silence is broken. BOOOOOM!!! Yes, it is you, shooting at the fish. You have thirty bullets, and are determined to hit as many fish as possible. Move left with Q, right with W, and fire with P.

Fish Blast was written for the Spectrum by Martin Walker of Rugeley, Staffordshire.

```
  1 FOR a= USR "a" TO  USR "q"+
7: READ udg: POKE a,udg: NEXT a

  2 DATA 199,47,223,187,124,223
,47,199,224,248,206,151,207,254,
248,224
  3 DATA 7,31,115,233,243,127,3
1,7,227,244,251,221,62,251,244,2
27
  4 DATA 1,17,21,149,183,191,25
5,255
  5 DATA 254,198,192,240,192,19
2,192,192,126,24,24,24,24,24,24,
126,124,198,192,124,6,6,198,124,
198,198,198,254,198,198,198,198

  6 DATA 252,198,198,252,198,19
8,198,252,192,192,192,192,192,19
2,198,254,124,198,198,254,198,19
8,198,198,126,24,24,24,24,24,24,
24
  7 DATA 36,36,129,165,16,0,74,
98,146,73,36,146,73,36,146,73
  8 DATA 73,146,36,73,146,36,73
,146
  9 DATA 219,231,219,102,102,60
,60,24
 10 LET hi=0
 20 LET a$="                  AB
          "
 30 LET b$="
    CD            "
 50 LET d$="
          "
 60 LET po=15
 70 LET Bullets=0
 80 LET score=0
 90 BRIGHT 1: BORDER 5: PAPER 1
: INK 7: CLS
 95 PRINT #0; AT 0,0; PAPER 2;
BRIGHT 1;"
          "
 96 PRINT #1; PAPER 2; INK 7; B
RIGHT 1;"    BY Martin Walker. 1
984.      "
 100 FOR a=0 TO 31: PRINT  INK 2
; AT 19,a;"E"; AT 20,a;"■"; AT 2
1,a;"■": NEXT a
 110 FOR a=0 TO 31: PRINT  PAPER
 5; BRIGHT 0; AT 0,a;" "; AT 1,a
;" ": NEXT a
 120 PRINT  AT 0,11; BRIGHT 0; P
APER 5; INK 1;"FGHI JKLMN"
 130 PRINT  PAPER 3; AT 2,0;d$;
AT 3,0;d$; AT 4,0;d$
 150 PRINT  PAPER 3; INK 7; AT 4
,po;" O ": IF bullets>30 THEN  G
O TO 700
 155 PRINT  PAPER 2; INK 7; BRIG
HT 1; AT 21,7;"BULLETS USED = ";
bullets
 160 IF  INKEY$ ="q" AND po>0 TH
EN  LET po=po-1
 170 IF  INKEY$ ="w" AND po<29 T
HEN  LET po=po+1
 180 IF  INKEY$ ="p" THEN  BEEP
.005,5: BEEP .005,10: LET bullet
s=bullets+1: GO TO 500
 185 PRINT  PAPER 2; INK 7; BRIG
HT 1; AT 21,7;"BULLETS USED = ";
bullets
 190 PRINT  INK 5; AT 17,0;a$
 200 PRINT  INK 3; AT 14,0;b$
 210 LET a$=a$(31)+a$( TO 31)
 220 LET b$=b$(2 TO )+b$(1)
 230 GO TO 150
 500 FOR g=5 TO 18
 510 PRINT  INK 6; AT g,po+1;"N"

 520 IF  SCREEN$ (g,po) <> " " T
HEN  GO TO 600
 530 PRINT  AT g,po+1;" "
 540 PRINT  INK 5; AT 17,0;a$; I
NK 3; AT 14,0;b$
 550 LET a$=a$(31)+a$( TO 31): L
ET b$=b$(2 TO )+b$(1)
 560 BEEP .0010,60: NEXT g
 570 GO TO 150
 600 PRINT  AT 3,1; FLASH 1;"HIT
": FOR p=0 TO 3: FOR h=0 TO 7: P
RINT  INK h; AT g,po;"OP"; AT g+
1,po;"PO": PRINT  INK h; AT g,po
;"PO"; AT g+1,po;"OP": BEEP .008
,p: NEXT h: NEXT p: PRINT  BRIGH
T 1; PAPER 3; FLASH 0; AT 3,1;"
          "
 610 LET score=score+50
 620 PRINT  AT g,po;"  "; AT g+1
,po;"  ": GO TO 150
 700 BRIGHT 1: PAPER 0: BORDER 0
: INK 7: CLS
 710 PRINT  AT 0,4;"Your Final S
core Was ";score
 720 IF score>hi THEN  LET hi=sc
ore
 730 PRINT  AT 2,3;"Your High Sc
ore So Far ";hi
 740 PRINT  INK  RND *6+1; AT 6,
6;"Another Game (Y/N)"
 750 IF  INKEY$ ="y" THEN  GO TO
 60
 760 IF  INKEY$ ="n" THEN  BRIGH
T 0: INK 0: PAPER 7: BORDER 7: C
LS : LIST
 770 BEEP .005, RND *60+1: GO TO
 740
```

ANSWER THE PHONE

The phone is ringing on the other side of the screen. All you have to do is Answer the Phone. Simple? Well, not really. Your dog has chewed holes in the floor, and a TV repair man has dropped live cables into them, so if you fall into any of the holes you will be electrocuted.

Written for the 16K ZX-81 by C Shingles of Halesowen, West Midlands.

```
  1 LET X=0
  2 LET PA=0
  3 LET SC=0
  4 LET K=0
  5 LET LEV=1
 10 CLS
 11 PRINT "          ANSWER THE P
HONE"
 12 PRINT
 13 PRINT "          INSTRUCTIO
NS"
 15 PRINT ;;"ALL YOU DO IS ANSU
ER THE PHONE. EASY?,NO,YOU SEE Y
OUR DOG HAS  CHEWED HOLES IN TH
E FLOOR AND A T.V. REPAIR MAN DR
OPPED LIVE  WIRES IN."
 16 PRINT ;;"SO YOU MUST JUMP O
VER THE HOLES OR BE ELECTROUTED.
OH,YES IF A  HOLE IS TO LONG YO
U WILL NEED A HYPER-JUMP,OF WHIC
H YOU HAVE 1  PER LEVEL.....GOO
D LUCK.....";;
 20 PRINT ;;"          KEYS

 30 PRINT "(X)-RIGHT
          (J)-JUMP
          (H)-HYPER-JUMP"
 35 PRINT AT 21,0;"PRESS ANY KE
Y TO START"
 40 IF INKEY$="" THEN GOTO 40
 50 CLS
 60 LET A=INT (RND*22)+3
 70 LET S=INT (RND*22)+3
 80 LET D=INT (RND*22)+3
 90 LET F=INT (RND*22)+3
100 LET G=INT (RND*22)+3
110 PRINT AT 9,0;"
120 FOR F=10 TO 20
130 PRINT AT F,0;"
140 NEXT F
141 PRINT AT 0,0;"SCORE=";SC
145 PRINT AT 9,26;"
                  "
150 IF LEV>=1 THEN PRINT AT 9,A
;"  "
155 IF LEV>=2 THEN PRINT AT 9,S
;"  "
160 IF LEV>=3 THEN PRINT AT 9,D
;"  "
165 IF LEV>=4 THEN PRINT AT 9,F
;"  "
170 IF LEV>=5 THEN PRINT AT 9,G
;"  "
199 REM ***MOVE***
200 PRINT AT 8,X;"$";AT 8,X;" "
210 IF INKEY$="X" THEN LET X=X+
1
211 IF INKEY$="X" THEN LET SC=5
C+10
220 IF INKEY$="J" THEN GOTO 300
230 IF INKEY$="H" THEN GOTO 350
231 IF X=A AND LEV>=1 THEN GOTO
600
232 IF X=S AND LEV>=3 THEN GOTO
600
233 IF X=D AND LEV>=3 THEN GOTO
600
234 IF X=F AND LEV>=4 THEN GOTO
600
235 IF X=G AND LEV>=5 THEN GOTO
600
240 IF X>=26 THEN GOTO 1000
250 GOTO 200
300 PRINT AT 7,X+1;"$";AT 7,X+1
;"  "
305 PRINT AT 8,X+2;"$";AT 8,X+2
;"  "
320 LET X=X+2
330 GOTO 200
350 IF K=1 THEN GOTO 390
355 PRINT AT 7,X+1;"$";AT 7,X+1
;"  "
360 PRINT AT 7,X+2;"$";AT 7,X+2
;"  "
370 LET X=X+3
380 LET K=K+1
385 LET SC=SC-100
390 GOTO 200
600 FOR F=8 TO 10
610 PRINT AT F,X;" "
620 NEXT F
630 FOR F=1 TO 40
640 PRINT AT 10,X;"$";AT 10,X;"
B"
650 NEXT F
660 CLS
700 PRINT AT 10,0;"YOU ANSWERED
 ";PA;" PHONES ";AT 12,0;" AND S
CORED ";SC
710 PRINT "PRESS A KEY TO REPLA
Y"
720 IF INKEY$="" THEN GOTO 720
730 GOTO 1
800 STOP
1000 CLS
1001 LET U=INT (RND*3)+1
1005 IF U=1 THEN LET U$="YOUR MO
M"
1010 IF U=2 THEN LET U$="THE BAN
K MANAGER."
1015 IF U=3 THEN LET U$="A DOG-F
ISH"
1020 IF U=3 THEN LET U$="YOUR FR
IEND."
1025 LET Y=INT (RND*2)+1
1030 IF Y=1 THEN LET Y$="WANTING
 YOU TO COME OUT TO PLAY."
1035 IF Y=2 THEN LET Y$="ASKING
TO BORROW A FIVER."
1040 IF Y=3 THEN LET Y$="CALLING
 TO SAY HELLO."
1100 PRINT AT 10,0;" ITS ";U$;AT
 12,0;Y$
1120 FOR F=1 TO 100
1130 NEXT F
1140 LET LEV=LEV+1
1200 LET SC=SC+100
1300 LET X=0
1400 LET PA=PA+1
1450 LET K=0
1500 GOTO 50
2001 SAVE "PHONE"
2002 RUN
```

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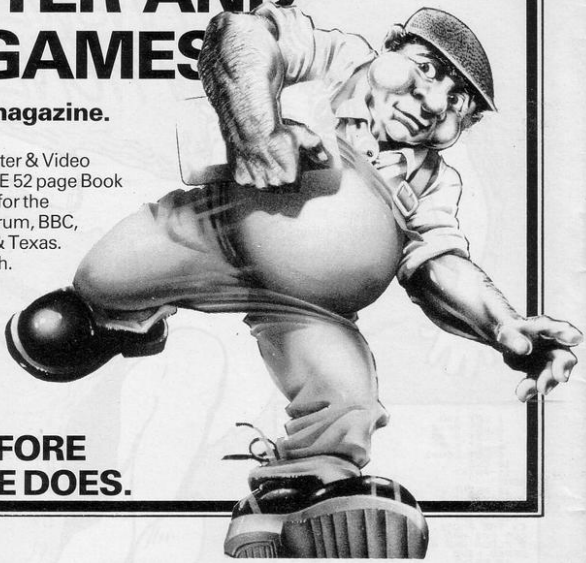

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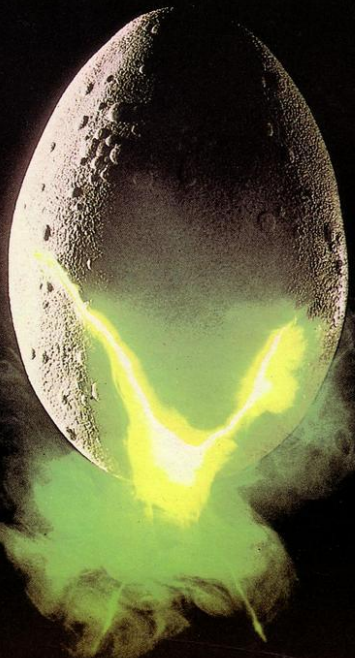

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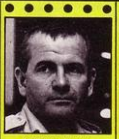

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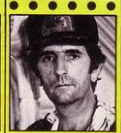

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